DECEMBER, 1952

SURGERY
GYNECOLOGY AND OBSTETRICS

Section

INTERNATIONAL ABSTRACTS OF SURGERY

LOYAL DAVIS, EDITOR

ASSOCIATE EDITORS

SUMNER L. KOCH MICHAEL L. MASON

ADVISORY BOARD

ROBERT M. JANES, TORONTO

AMBROSE H. STORCK
GENERAL SURGERY

JOE VINCENT MEIGS
GYNECOLOGY

LAWRENCE CHAFFIN
ABDOMINAL SURGERY

DOUGLAS P. MURPHY
OBSTETRICS

THOMAS H. BURFORD
THORACIC SURGERY

CHARLES C. HIGGINS
UROLOGY

FRANK E. STINCHFIELD
ORTHOPEDIC SURGERY

CONRAD BERENS
OPHTHALMOLOGY

FRANCIS C. GRANT
NEUROLOGICAL SURGERY

NORTON CANFIELD
LARYNGOLOGY

WILLIAM S. KISKADDEN
PLASTIC SURGERY

HAROLD I. LILLIE
OTOLOGY

EUGENE P. PENDERGRASS, RADIOLOGY

CONTENTS—DECEMBER, 1952

COLLECTIVE REVIEW

Plasma Expanders. Captain ARTHUR L. GROPPER, M.D., Captain LAWRENCE G. RAISZ, M.D., and Colonel WILLIAM H. AMSPACHER, M.D., U.S. Army, Fort Sam Houston, Texas..... 521

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

The Operative Removal of Tumors of the Parotid Salivary Gland. HAYES MARTIN..... 543
Management of Head and Neck Cancer by the General Surgeon. H. MASON MORFIT..... 543
Application of Combined Hemimandibulectomy and Neck Dissection to Oral Carcinoma. WALTER W. CARROLL..... 543

Eye

The Physiopathology and the Technique of Iridencleisis. SAMUEL J. MEYER..... 544
Possible Malignant Melanoma of the Choroid. J. ARNOLD DEVEER..... 544

Nose and Sinuses

Intranasal Chondrosarcoma. LAWRENCE J. LAWSON 544
Treatment of Oroantral Fistula. LINDEN J. WALLNER 545

Neck

Recurrent Nodular Goiter in Children. R. H. HEPTINSTALL and SIR ARTHUR PORRITT..... 545
Cervical Neurofibroma in the Differential Diagnosis of Carotid Body Tumor. T. H. CULLEN and R. S. MONRO..... 545
Cancer of the Hypopharynx and Its Surgical Treatment. RONALD W. RAVEN..... 545
Combined Operations in the Management of Cancer of the Head and Neck. JOHN O. VIETA and JOSEPH E. MULÉ..... 545

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings; Cranial Nerves

Carotid-Cavernous Aneurysm. GIOVANNI RUGGIERO and FRANCESCO CASTELLANO..... 547
Extradural Hemorrhage. K. C. BRADLEY..... 547
Delayed Onset of Symptoms Due to Extradural Hematomas. ARTHUR B. KING and JOHN W. CHAMBERS..... 547
Expanding Intracranial Lesions in Childhood. HAROLD D. PALMER and EDWARD S. MURPHY.. 548
Brain Tumors in Children. ARTHUR B. SMITH..... 593
Experimental Cerebral Radionecrosis Produced by Contact Roentgen Therapy. J. GUILLAUME, I. BERTRAND, P. L. GÉRARD, J. PECKER..... 593

Spinal Cord and Its Coverings

Spinal Cord Involvement by Schistosomiasis Mansoni. GORDON L. ROSS, JOHN W. NORCROSS, and GILBERT HORRAX..... 548
Intraspinal Lesions Simulating Protruded Intervertebral Discs. W. MCK. CRAIG, H. J. SVIEN, H. W. DODGE, JR., and J. D. CAMP..... 548

SURGERY OF THE THORAX

Chest Wall and Breast

Spontaneous Fractures of Both First Ribs. S. AUBREY JENKINS..... 549
Tuberculous Disease of the Breast. K. C. MCKEOWN and K. W. WILKINSON..... 549

Trachea, Lungs, and Pleura

Plastic Reconstruction of Trachea and Bronchi. H. MÉTRAS, H. LONGEFAIT, M. GRÉGOIRE, and L. HARTUNG..... 549
Encysted Pleuropulmonary Hematomas. RENÉ SAUVAGE and PIERRE DELAFONTAINE..... 550
Primary Carcinoma of the Lung. S. AUBREY GITTENS and JOHN P. MIHALY..... 550
Newer Palliative Measures in the Management of Inoperable Bronchogenic Carcinoma. EDGAR MAYER and BERNARD ROSWIT..... 550
The Open Closure of the Bronchus and the Resection of the Carina and of the Tracheal Wall. VIKING OLOV BJÖRK, ERIC CARLENS, and CLARENCE CRAFOORD..... 550
Pathophysiology of Respiration After Lobectomy and Pulmonectomy. J. MAURATH and M. WERBER..... 551
Aspiration and Aspiration Pneumonia. E. STUTZ... 591
The Roentgenogram of the Middle Lobe Syndrome. K.-H. WILLMANN..... 594

Heart and Pericardium

Functional Problems in Cardiac and Pulmonary Diseases and Remarks on Surgical Intervention. H. W. KNIPPING..... 551

Successful Removal of Tumor of the Heart. ELMER R. MAURER 552
Surgical Considerations of Intrathoracic Aneurysms of the Aorta and Great Vessels. DENTON A. COOLEY and MICHAEL E. DEBAKEY 552

Esophagus and Mediastinum

Spontaneous Laceration of the Esophagus. CARLO MAURO 553
Carcinoma of the Esophagus. EDWARD F. PARKER, CHARLES B. HANNA, and RAYMOND W. POSTLETHWAIT 554

SURGERY OF THE ABDOMEN

Abdominal Wall and Peritoneum

Mesenteric Thrombosis Following Blunt Abdominal Trauma. WILLIAM S. MCCUNE, JOHN M. KESHISHIAN, and BRIAN B. BLADES 555

Gastrointestinal Tract

Arterial Blood Supply of Human Stomach. JOHN REID BROWN and JOHN WILLIAM DERR 555
Massive Hypertrophic Gastritis. HOWARD A. PATTERSON 555
Segmental Gastric Resection for Peptic Ulcer. OWEN H. WANGENSTEEN 556
Indications for Surgical Treatment of Gastric and Duodenal Ulcers and Their Complications. J. LIMBOSCH 556
Selection of Duodenal Ulcer Patients for Vagotomy. STEPHEN J. STEMPIEN, FRANKLIN B. WILKINS, and JOSEPH A. WEINBERG 557
Results of Vagotomy During 7 Years. K. S. GRIMSON, C. R. ROWE, JR., and H. M. TAYLOR 558
Acute Intestinal Obstruction in Infancy. CHARLES W. MCLAUGHLIN, JR., and JOHN D. COE 559
Acute Perforation in Regional Enteritis. J. G. GOW and ANTHONY WALSH 559
Enteritis Necroticans. MARCEL PATTERSON and HAROLD D. ROSENBAUM 559
The Present Status of Exfoliative Cytology in the Diagnosis of Gastrointestinal Malignancy. CYRUS E. RUBIN, WALTER L. PALMER, and JOSEPH B. KIRSNER 560
The Surgical Treatment of Chronic Ulcerative Colitis. W. B. GABRIEL 560
Adenomatous Polyps of the Colon and Rectum. WILLIAM R. SANDUSKY and JOHN ROBERT PARSONS, JR 561
Cancer of the Rectum. FREDERICK A. COLLER, RICHARD H. LILLIE, MILTON F. BRYANT, JR., and WILLIAM E. BROWN, III 562
Construction of a Rectal Sphincter and Restoration of Anal Continence by Transplanting the Gracilis Muscle. KENNETH L. PICKRELL, T. RAY BROADBENT, FRANK W. MASTERS, and JAMES T. METZGER 562
Chronic Ulcerative Colitis and Pregnancy. MARCEL PATTERSON and ERNEST J. EYTINGE 569
Emergency Roentgenologic Examinations in Severe Hemorrhages of Gastroduodenal Origin. Émile DELANNOY, P. GAUTIER, A. SOULIER, and G. LEMAITRE 595

Liver, Gallbladder, Pancreas, and Spleen

Early Results Following Therapeutic Ligation of the Hepatic Artery. ARTHUR I. CHENOWETH 562
Acute Pancreatitis. The Significance of an Associated Hypertension. IAN HEINZ 563
Islet Cell Adenoma of the Pancreas. HAROLD BROWN, HAROLD P. HARGREAVES, and FRANK H. TYLER 563
Splenic Puncture. JYOTI B. CHATTERJEA, CARLOS MEZA ARRAU, and WILLIAM DAMESHEK 563
Surgical Aspects of Hypersplenism. ROBERT M. ZOLLINGER, MARY M. MARTIN, and ROGER D. WILLIAMS 564

Miscellaneous

Abdominal Wounds in Jungle Warfare. JOHN A. BATY 565
Discussion on Hiatus Hernia. F. AVERY JONES, N. R. BARRETT, A. S. JOHNSTONE, R. H. FRANKLIN, and Others 565
The Nonspecific Inflammatory Ileocecal Tumors. G. BERNHART 566
The Roentgen Findings in Instances of "Digestive Megasplanchnia." LUDOVIG FISCHER 594
Anatomic Studies of the Liver, the Kidneys and the Pancreas in Postoperative Fatalities. Contribution to the Study of the Hepatorenal Syndrome. F. HARTL 597

GYNECOLOGY

Uterus

Primary Adenocarcinoma of the Cervix. THOMAS K. HEPLER, MALCOLM B. DOCKERTY, and LAWRENCE M. RANDALL 567
Causes of Death in Carcinoma of the Cervix Influencing Modern Trends in Treatment. SIMON V. WARD, THOMAS BENTON SELLERS, and JULIUS T. DAVIS, JR 567

Adnexal and Periuterine Conditions

Recent Experimental Investigation on the Genesis of Ovarian Tumors. O. MUEHLBOCK 567

Miscellaneous

Use of the Vaginal Smear as a Screening Test. HERBERT L. LOMBARD, MARGARET MIDDLETON, SHIELDS WARREN, and OLIVE GATES 568

OBSTETRICS

Pregnancy and Its Complications

The Etiology of Periodical Metrorrhagia of False Menstruation of Pregnancy. Its Relationship to Disease Conditions. JOHN G. KAMBOURAKIS ... 569
Considerations on the Pathogenesis of Varicosities During Pregnancy. P. PIULACHS, F. VIDAL-BARRAQUER, and J. M. BIEL 569
Chronic Ulcerative Colitis and Pregnancy. MARCEL PATTERSON and ERNEST J. EYTINGE 569
Hodgkin's Disease in Pregnancy, with a Report of 12 Cases. JAMES P. HENNESSY and ANTONIO ROTTINO 570

Labor and Its Complications

With Reference to the "Crisis" in the Matter of the Indications for Cesarean Section. HUGDIETER NOACK 570

GENITOURINARY SURGERY

Adrenal, Kidney, and Ureter

Surgery of the Horseshoe Kidney. OSWALD S. LOWSLEY 571

New Growths of the Kidney and Ureter. E. W. RICHES, I. H. GRIFFITHS, and A. C. THACKRAY 571

A New Concept of the Etiology of Megaloureters. ORVAR SWENSON, H. EDWARD MACMAHON, WILLIAM E. JACQUES, and JAMES S. CAMPBELL 573

The Management of Ureteral Injuries. JOHN F. PATTON 573

Physiology of the Transitional Epithelium of the Urinary Tract. Vesical Secretion in the Dog. JOSE DE J. ALVAREZ-IERENA 574

The Problem of the Nonopaque Urinary-Tract Stone. S. RICHARD MUELLNER and BERNARD SEARS 574

Bladder, Urethra, and Penis

Trigonal Cystectomy. R. COUVELAIRE 574

Method of Retrograde Passing of a Probe in Impermeable Posttraumatic Strictures of the Urethra. H. HENNINGER 576

The Operative Treatment of Urethral Strictures. H. GROH 577

The Present Treatment of Diffuse Periurethral Phlegmon. J. DUCASSOU 577

Genital Organs

Cancer of the Prostate. ADOLFO FORT 578

Treatment of Ectopia of the Testicle. Results Observed in 132 Patients. JUAN ZAÑARTU and EDWIN C. HAMBLEN 578

TESTICULAR TUMORS. OLE J. JENSEN, JR. 579

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

Conditions of the Bones, Joints, Muscles, Tendons, Etc.

Lipoidosis of the Tendons. J. BORSAY, J. CSIPAK, and G. DETTRE 580

Epicondylitis of the Humerus. HANS KOHLMAYER .. 580

Treatment of Abscesses Associated with Spinal Tuberculosis. JOHN H. ALDES 580

The Traumatic Necrosis of the Talus. HANS JUD ... 581

Vertebra Plana Totalis. G. SCHMID 595

Surgery of the Bones, Joints, Muscles, Tendons, Etc.

The Surgical Elbow Pseudarthrosis for Impaired Pronation and Supination. M. GUILLEMINET and R. LACOUR 581

Results of Insertion of Cancellous Bone in Cases of Pseudarthroses of the Carpel Navicular. OTTO RUSSE 581

New Aspects for the Surgical Treatment of Severe Spinal Curvatures. PIERRE BERTRAND 582

Reposition with Arthroplasty for Correction of Congenital Dislocation of the Hip in Adults. R. MERLE D'AUBIGNÉ 582

Repair of the Soft Tissue in Orthopedic and Traumatic Surgery. LAURO BARROS DE ABREU 591

Fractures and Dislocations

Carpometacarpal Dislocations. The Total Dislocations. J. AULONG, and J. GIRARD 583

The Pertrochanteric and Subtrochanteric Fractures. J.-O. RAMADIER and J. TEINTURIER 584

Internal Fixation for Intertrochanteric Fractures. G. S. LEVENTHAL 584

The Conservative Treatment of Trochanteric Fractures of the Femur. RAPHAEL R. GOLDENBERG and ANTHONY J. SANTORO 584

Prefractural Status of the Femoral Neck. J. J. DUFOUR 585

Remarks with Reference to the Mechanics and the Technique of Nailing of Fracture of the Femoral Neck. HEINZ GELBKE 585

Fractures of the Shaft of the Tibia and Fibula. EARNEST B. CARPENTER, JOHN J. DOBBIE, and CHRISTIAN F. SIEWERS 586

Conservative Treatment of Fractures of the Tibial Plateau. CARL E. BADGLEY and SYLVESTER J. O'CONNOR 586

Treatment of Fractures of the External Tibial Condyle. L. DE LA SIERRA CANO and M. BLANCO ARGÜELLES 587

Orthopedics in General

Homoplastic Bone Granulate as Implantation Material in Orthopedic Surgery. OLOV LINDAHL 587

Experimental Investigations of the Mechanism of Spontaneous Rupture of The Tendons. J. BORSAY, J. CSIPAK, and G. DETTRE 587

SURGERY OF BLOOD AND LYMPH SYSTEMS

Blood Vessels

Considerations on the Pathogenesis of Varicosities During Pregnancy. P. PIULACHS, F. VIDAL-BARRAQUER, and J. M. BIEL 569

Nontraumatic Arterial Aneurysms of the Extremities. P. WERTHEIMER, J. SAUTOT, and J. CHEVALIER 588

Endarteriectomy, or Surgical Restoration of the Lumen of an Obstructed Artery in Arteriosclerosis Obliterans. A. NÚÑEZ NÚÑEZ, B. MILANÉS, and J. RODRIGUEZ IÑIGO 588

Heterogeneous Arterial Grafts. J. SAUTOT, J. BOST, and Y. TOURAINE 588

Deep Venous Thrombosis in the Leg Following Effort or Strain. CHILTON CRANE 589

Blood; Transfusion

Reanimation with Endocarotid Transfusion in a Cranial Direction. A. M. DOGLIOTTI, A. COSTANTINI, G. DEI POLI, and L. CALDAROLA 590

Lymph Glands and Lymphatic Vessels

Hodgkin's Disease in Pregnancy, with a Report of 12 Cases. JAMES P. HENNESSY and ANTONIO ROTTINO 570

SURGICAL TECHNIQUE

Plasma Expanders. Collective Review. CAPTAIN ARTHUR L. GROPPER, M.D., CAPTAIN LAWRENCE G. RAISZ, M.D., and COLONEL WILLIAM H. AMSPACHER, M.D., U.S. Army, Fort Sam Houston, Texas 521

Operative Surgery and Technique; Postoperative Treatment

Reanimation with Endocarotid Transfusion in a Cranial Direction. A. M. DOGLIOTTI, A. COSTANTINI, G. DIE POLI, and L. CALDAROLA 590

Intra-Arterial Infusion—Simplified Technique. JOHN E. KEET, GEORGE O. HALSTED, VINCENT J. COLLINS and LOUIS M. ROUSSELOT 590

Fatal Pulmonary Embolism in Heidelberg Clinics. (Study of 377 Cases Over a 20 Year Period). KURT SPOHN 590

Antiseptic Surgery; Treatment of Wounds and Infections.

Repair of the Soft Tissue in Orthopedic and Traumatic Surgery. LAURO BARROS DE ABREU 591

Anesthesia

Aspiration and Aspiration Pneumonia. E. STUTZ ... 591

Surgical Instruments and Apparatus

Medical Air Evacuation in Korea and Its Influence on the Future. ALLEN D. SMITH 591

PHYSICOCHEMICAL METHODS IN SURGERY

Roentgenology

Carotid-Cavernous Aneurysm. GIOVANNI RUGGIERO and FRANCESCO CASTELLANO 547

Brain Tumors in Children. ARTHUR B. SMITH 593

Experimental Cerebral Radionecrosis Produced by Contact Roentgen Therapy. J. GUILLAUME, I. BERTRAND, P.-L. GÉRARD, J. PECKER 593

The Roentgenogram of the Middle Lobe Syndrome. K.-H. WILLMANN 594

The Roentgen Findings in Instances of "Digestive Megasplanchnia." LUDOVIG FISCHER 594

Emergency Roentgenologic Examinations in Severe Hemorrhages of Gastroduodenal Origin. ÉMILE DELANNOY, P. GAUTIER, A. SOULIER, and G. LEMAITRE 595

Vertebra Plana Totalis. G. SCHMID 595

Miscellaneous

Genetic Aspects of Radiation Risks. ALMA HOWARD 595

The Hemorrhagic Phase of the Acute Radiation Syndrome Due to Exposure of the Whole Body to Penetrating Ionizing Radiation. E. P. CRONKITE, G. J. JACOBS, GEORGE BRECHER, and GEORGE DILLARD 596

MISCELLANEOUS

Clinical Entities—General Physiological Conditions

Why Are the Antibiotics Ineffective Against Viral Infections? C. LEVADITI 597

The Behavior of Lysoenzymes in the Blood Serum of Patients Suffering from Neoplasms. MARIO FIORE 597

Plasmocytoma (Multiple Myeloma) and Trauma. ALBERT K. SCHMAUSS 597

Anatomic Studies of the Liver, the Kidneys and the Pancreas in Postoperative Fatalities. Contribution to the Study of the Hepatorenal Syndrome. F. HARTL 597

Experimental Surgery

The Thrombin Degradation Test According to Lenggenhager. Clinical and Experimental Studies. P. SEULBERGER amd H. PETERS 598

Experimental Studies on Animals Regarding the Circulatory Action of the Synthetic Anticoagulant Thrombocid. JOSEF KONCZ and EMIL BUECHERL 598

Studies on the Vasculoactive Component of Thrombocid. EMIL BUECHERL and JOSEF KONCZ 599

Experimental Ascites; Its Production and Control. JACOB K. BERMAN and JAMES E. HULL 599

General Review of Sheehan's Syndrome. J. LENG-LEVY and R. BURLAUD 599

INDEX TO VOLUME 95

I. Subject Index

II. Author Index

INTERNATIONAL ABSTRACTS OF SURGERY

VOLUME 95 DECEMBER, 1952 NUMBER 6

COLLECTIVE REVIEW

PLASMA EXPANDERS

ARTHUR L. GROPPER, M.D., Captain, LAWRENCE G. RAISZ, M.D., Captain, and WILLIAM H. AMSPACHER, M.D., Colonel, U. S. Army, Fort Sam Houston, Texas

BLOOD is recognized as the only completely satisfactory replacement solution in shock due to hemorrhage. Today, transfusion is a relatively safe routine hospital procedure, but, nevertheless, certain unsolved problems remain. At present blood storage for longer than 3 or 4 weeks is not feasible, nor can blood be procured in unlimited quantities. In event of disaster, therefore, it would be quite impossible to insure an adequate supply of blood for shock therapy. This consideration has intensified interest in other substances that can be used to expand blood volume, yet be stockpiled in large quantities and stored indefinitely. This review will deal with substances that offer promise in answering this need and are referred to henceforth as "expanders."

PHYSIOLOGIC CONSIDERATIONS

Historical background. In his review of shock, Blalock cited evidence indicating that there is a wide margin of safety in the oxygen-carrying capacity of the blood and that the primary objective in the treatment of shock is restoration of the circulating volume rather than of the hemoglobin. Early attempts at blood replacement are adequately covered in Amberson's (3) review. Initial experiments demonstrated that mammalian organs continue to live for some time when perfused with crystalloid solutions, although they develop edema. It is impossible, however, to sustain the intact living animal with complete replacement of blood by oxygenated salt solutions, since these pass rapidly from the circulation into the interstitial spaces. This rapid escape of crystalloid solutions from the circulation has been amply confirmed. In 1896 Starling's classic work led to recognition of the fact that the capillary membrane is relatively impermeable to plasma proteins, and that they, therefore, exert an osmotic force that tends to retain fluid in the circulation.

Molecular size in relation to plasma retention and renal excretion. All of the expanders are macromolecular colloids which, therefore, penetrate living membranes only with difficulty. Being prepared by chemical synthesis or degradation, they are always mixtures of various molecular sizes. This imposes variable physiologic properties depending on the molecular weight range and shape of any one preparation.

Immediately after an infusion, most of the expander can be accounted for in the blood. Several avenues of loss are present. Renal loss by filtration is the chief pathway for early removal of most expanders from the body, and available evidence suggests that tubular reabsorption or excretion does not occur to any large extent. This loss furnishes an index of the movement of molecules of different sizes across capillary membranes, since the glomerular membrane is freely permeable to materials with molecular weights of less than 10,000 and completely impermeable to those with weights greater than 70,000 (169). Although not exactly equivalent, the glomeruli of the kidney are at least similar to the capillary filters else-

From the Surgical Research Unit, Brooke Army Hospital, Brooke Army Medical Center, Fort Sam Houston, Texas.

where in the body. It has recently been suggested that the glomeruli contain more pores per unit of filtering surface than the peripheral muscle capillaries and that the glomerular pores are somewhat larger (197).

One would expect the smaller molecules of a mixture to be rapidly excreted, so that in time the rate of excretion decreases and the mean molecular size of the retained fraction increases. Brewer studied specially prepared dextran fractions of narrow molecular weight range and compared the renal clearance of these fractions with that of creatinine, which in the dog measures the glomerular filtration rate. He found that dextran of 5,000 to 10,000 molecular range is cleared at the same rate as creatinine, that 25,000 molecular weight dextran is cleared at 19 per cent of the creatinine clearance, and that 38,000 molecular weight dextran is cleared at 6 per cent of the creatinine clearance. On computing these data, he reported that after a single injection, 50 per cent of these fractions would be excreted in one-quarter, 1, and 5 hours, respectively, and concluded that the smaller molecules are of little use as expanders. This inverse relationship between rate of excretion and molecular size has also been demonstrated for gelatin (112), oxypolygelatin (68), dextran (38), and polyvinylpyrrolidone (41, 71). (See Table I).

Some of the expander enters the interstitial space, which includes lymph (3, 54, 88). A small part may be excreted through the bile and into the gastrointestinal tract. Theoretically, the largest molecules would circulate perpetually unless picked up by scavenger cells and either metabolized or stored. That storage does occur with several of the expanders, especially those of high molecular weight, has been shown experimentally. Knutti (139, 140) and Keith present data which indicate that material stored in cells may remain in equilibrium with the interstitial fluid and be gradually excreted.

The details of the mechanism by which plasma expansion is achieved and maintained after the infusion of expanders are not entirely clear at present. Complete understanding of this mechanism is hampered by the difficulties of accurate measurement of the fluid shifts and oncotic pressure. Hemodilution due to expander infusion is a constant finding and is reflected in a decrease of hematocrit and total protein concentration. Goudsmit (81) thought that the protein changes are attributable entirely to dilution. On the other hand, there is strong evidence that in some instances a true change in the total amount of circulating protein takes place (68, 88, 114). Available protein stores may be an important factor in determining this response, for they have been shown to influence changes in the total circulating protein after saline infusions (234). Kozoll (150) suggested that macromolecular substances start a cycle of "autotransfusion," in that they may be replaced by labile protein stores on leaving the blood stream, and in this manner maintain hemodilution. After infusions of pectin he noted that hemodilution is evident for some time after the pectin concentration in the blood has fallen to insignificant levels. Similar observations were made by Feigen in studying oxypolygelatin, and in our laboratory with dextran (88). The sustained increase in plasma volume following infusion of an expander is, therefore, not necessarily related to the amount of expander retained in the circulation.

Requirements of a good plasma expander and problems of evaluation. The proposed requirements of a satisfactory plasma expander are as follows: (1) it must maintain a satisfactory colloid pressure, (2) it must be capable of production with constant composition and at reasonable cost, (3) it should possess a viscosity suitable for intravenous injection, (4) it must be stable on exposure to wide ranges of temperature and after prolonged storage, (5) it should be easily sterilized, (6) it must be pyrogen-free, (7) it must ultimately be excreted or metabolized and must not cause tissue damage, either immediate or delayed, and (8) it must be nonantigenic. Optimal retention and excretion specifications have not yet been defined.

In the following discussion of individual expanders, comparison of the results with different materials must be made with caution. Differences in retention and excretion data and in hemodynamic effects may be influenced not only by the type of material but by the individual lot, dose, concentration, and experimental technique. Studies in shock are subject to further variability. The usual criteria for evaluating shock therapy, such as restoration of the blood pressure and blood volume and survival, are not necessarily correlated with one another. Finally, excretion data of animals show much greater individual species variation than those of human beings, and are more easily influenced by age, diet, temperature, and state of hydration (233).

ACACIA

Acacia (also called gum arabic) is a hydrophilic colloid that forms aggregates of varying size in solution. It is this aggregating property that keeps the small molecular weight acacia (1,200 to 2,400) in the circulation sufficiently long to make

it useful as an expander. A 6 per cent solution of acacia is approximately iso-oncotic with normal human and dog plasma.

In 1906 Morawitz first demonstrated that gum saline solutions could be successfully used for blood replacement in dogs. Amberson (3) has reviewed the literature which establishes the ability of gum saline solution to restore blood pressure and maintain life in experimental shock, although a minority of reports deny that acacia has any advantage over saline solution in this respect (113, 205).

Reactions to acacia have been reported in man (80, 174, 238) and animals (94). They range in severity from severe anaphylactoid states to pyrogenic and urticarial responses. The aggregation and increased sedimentation of erythrocytes which is seen is an effect common to all macromolecular substances. Christie reported that acacia may decrease the oxygen-carrying capacity of erythrocytes by as much as 40 per cent, but Korth (146) recorded no significant changes in this respect.

The significance of the decrease in plasma protein concentration that is seen after acacia administration is undetermined. As previously noted, Goudsmit (80) interpreted it as a dilution phenomenon, but others (54, 103) have suggested that acacia might interfere with plasma protein production. Yuile (282), Mori, and Smalley (239) found the hypoproteinemia produced by chronic acacia administration is only gradually corrected over a period of months. Moreover, they noted that fibrinogen is reduced more than other plasma proteins, which they interpreted as evidence of liver damage. The animals appeared healthy, however, despite high acacia and low plasma protein levels. It is not clear from this study that the slow plasma protein recovery was really due to liver damage, for the acacia remaining in the blood during the recovery period might have diminished the stimulus for plasma protein production.

There is no evidence that acacia is metabolized in the body. Although acacia is known to be stored in the liver, the significance of this storage is not certain. In Smalley's study (239), dogs tolerated twenty times the therapeutic dose of acacia and survived 2 years despite the liver storage. In Falkenstein's case 7.1 per cent of the administered acacia was present in the liver 6 years after its administration. Andersch found approximately 30 per cent stored in the livers of dogs, 50 per cent in the livers of rabbits, and 43 per cent in a human liver within 3 days after giving a 30 per cent solution of acacia; more significantly perhaps, he found 30 per cent storage in the liver of a rabbit 3 months after the administration of acacia. The histologic changes associated with storage have been described by Mannix in a human being and by Hueper (116) in rabbits and dogs. Foam cells, resembling those seen in lipoid storage disease, are the characteristic unit lesion. Similar lesions involving the blood vessels as well as the reticuloendothelial cells have been described by Hueper (116) after the infusion of several macromolecular substances, including pectin, gelatin, polyvinyl alcohol, and methylcellulose. Although in all likelihood the stored material is acacia, it has not been specifically identified. At a recent American Medical Association symposium Bollman (26) mentioned giving repeated weekly injections to 2 dogs for 6 months, after which time the animals lived for 10 years with large "acacia livers." Liver function tests showed no impairment and biopsies showed evidence of acacia storage without tissue reaction.

Hartmann found that in man the urinary excretion of acacia is 25 per cent in the first 48 hours and 60 per cent in 7 days. Andersch found only 20 per cent urinary excretion of a 30 per cent acacia solution injected into a subject. Summarizing the data from three papers, Amberson (3) reported 61, 43, and 25 per cent blood retention at 24, 48, and 72 hours, respectively.

GELATIN

Although gelatin was suggested as an expander at about the same time as acacia, Bayliss discouraged its use on the grounds that it might transmit tetanus and anthrax spores, that it is antigenic, and that it produces intravascular clotting. Indeed the gelatin preparations made from animal hide introduced the risk of transmitting tetanus and anthrax (46). It later became apparent that antigenicity and infection are not problems with properly processed gelatin (132, 241), but Bayliss' warnings were sufficient to discourage interest until shortly before World War II. In the past 15 years, however, interest has been renewed and many different preparations of gelatin have been devised in an effort to overcome the practical difficulty of gelling and obtain a preparation that remains fluid at room temperature.[1]

The most intensely studied product (Knox P-20) has a number average molecular weight of 37,000

[1]Fluid gelatin. Very recently a "fluid gelatin" preparation that remains liquid at 4°C. has become available for study. It is prepared from osseous gelatin by treatment with anhydrides of dicarboxyllic acids. Preliminary studies in dogs show 80 per cent retention at 3 hours and 40 per cent at 24 hours (216), as well as a bleeding volume index that compares favorably with dextran and polyvinylpyrrolidone (202).

TABLE I.—THE INVERSE RELATIONSHIP BETWEEN THE RATE OF EXCRETION AND THE MOLECULAR SIZE

Material and source	Approx. molecular weight	Average cumulative urinary excretion		Subject	Author
		Time (hours)	Per cent of injected dose		
Gelatin					
1. Upjohn. Light	37,000	6	49	Man	Hoffman, W. S. (112)
Intermediate	47,000	6	43		
Heavy	58,000	6	29		
2. Knox. (fractionated by authors)				Dog	Knoefel, P. K. (137)
Whole	50,000*	4	11		
Fraction I	29,000*	4	38		
Fraction II	36,000*	4	12		
Fraction III	69,000*	4	5		
	Relative viscosity				
3. Upjohn. Low viscosity	2.4	5	50	Man	Lowell, A. (166)
		24	55		
Knox. High viscosity	5.8	5	20		
		24	30		
Oxypolygelatin					
Dr. Baxter	20,000*	5	65	Man	Siiteri, P. K. (235)
Dr. Baxter	20,000*	5	50	Man	Higgins, A. R. (109)
Dr. Baxter	15,000*	4	70	Dog	Raisz, L. G. (212)
Dr. Baxter	20,000*	4	55	Dog	Raisz, L. G. (212)
Dr. Baxter	20,000*	3	40	Dog (Replacement)	Gropper, A. L. (88)
Fluid gelatin					
Knox	87,000	5	40	Man	Siiteri, P. K. (235)
Dextran					
Swedish	60,000*	8	40	Man	Thorsen, G. (261)
British	75,000*	8	12	Man	Bull, J. P. (38)
Commercial Solvents Corp.	40,000*	6	33	Man	Bloom, W. L. (22)
		24	43		
Commercial Solvents Corp.	40,000*	3–4	38	Dog	Mayerson, H. S. (173)
Commercial Solvents Corp.	40,000*	4	45	Dog	Raisz, L. G. (212)
Commercial Solvents Corp.	40,000*	3	13	Dog (Replacement)	Gropper, A. L. (88)
		24	31		
	Intrinsic viscosity				
British	.29	24	14	Rabbit	Ricketts, C. R. (218)
	.36	24	6		
	.48	24	1		

with only 4 per cent of the molecules under 10,000 (77). A 6 per cent solution of this gelatin has approximately the same oncotic pressure as plasma (214, 215). In an interesting study, Little (161) noted that the molecules of P-20 gelatin move across injured capillaries only 35 to 60 per

TABLE I.—THE INVERSE RELATIONSHIP BETWEEN THE RATE OF EXCRETION AND THE MOLECULAR SIZE—Continued

Material and source	Approx. molecular weight	Average cumulative urinary excretion		Subject	Author
		Time (hours)	Per cent of injected dose		
Dextran Swedish specially prepared fractions	24,000	6 24	62 88	Rat	Grotte, G. (90)
	52,000	6 24	24 42		
	85,000	6 24	20 37		
	120,000	6 24	10 21		
	205,000	6 24	8 17		
Polyvinylpyrrolidone Hoffman*	"K" Value 50	24	10	Dog	Fine, J. (71)
Generaline* aniline	36	24	26	Mouse	Steele, R. (244)
	29	24	54		
Schenley*	30	24	54		
General aniline	33	6	41	Man	Cournand, A. (48)
		24	50		
General analine	33	5	30	Man	Welt, L., and Cannan, R. K. (276)
Schenley	29	5	33		

Molecular weight may be estimated in a variety of ways.

Figures marked with an asterisk are number average molecular weights, determined by osmotic pressure measurements or by hydrogen-cyanide-combining power.

Figures without an asterisk are weight average molecular weights, usually determined by ultracentrifugation or from viscosity measurements.

For materials of wide molecular weight range the average molecular weight is considerably lower than that of the weight average, since small molecules contribute to the former figure by their total *number* rather than by their total *weight*. For some of these materials only relative or intrinsic viscosity figures are given. The "K" value listed for PVP preparations is also determined by viscosity measurements. Although the precise relationship of "K" value and molecular weight has not been determined, a "K" 30 approximates a weight average molecular weight of 40,000, while "K" 50 approximates a weight of 100,000.

All data included in this table are from expansion experiments, that is, experiments in which infusions were made into an animal with a normal blood volume, except those noted as replacements. In the latter studies, the blood volume had been previously depleted by hemorrhage.

The PVP preparations numbered with an (*) were labeled with I^{131}, and the excretion figures refer to radioactivity.

cent as readily as the plasma proteins. Different preparations, however, vary widely in their physical properties and this is reflected in the excretion and retention figures (Table I). It is clear that less degraded gelatins show greater retention initially (32, 112, 137, 166). By the end of 72 hours, however, there is no longer a difference in the retention of small and large molecular weight gelatin. Hoffman recorded 55 per cent immediate retention in the blood and 23 per cent excretion. At 24 hours, Jacobson (125) found that 13 per cent of the injected material was retained and 76 per cent excreted. Kozoll (148) recovered from 70 to 100 per cent of the injected gelatin in the urine, Hoffman 80 per cent, and Brunschwig (35) only from 57 to 60 per cent.

A good deal of experience has been accumulated with the use of gelatin solutions in various types of human and animal shock. These solutions have been found superior to saline solution and roughly equivalent to plasma for restoration of the blood pressure and blood volume and for maintenance of life in experimental hemorrhagic (79, 154, 155, 194, 199), traumatic (85), and tourniquet (136) shock. The superiority of gelatin solutions over saline solution in the treatment of burn shock is subject to controversy (59, 60, 136, 175).

The hemodilution attending infusions of gelatin is reflected in a decreased hematocrit, erythrocyte count, and total protein concentration (148, 159, 245). Levenson believed that the red cell mass is decreased by gelatin, but Little (160) reported that this is not a constant finding. The sedimentation rate is uniformly increased (148, 198) and there is erythrocyte aggregation in vivo, but this apparently does not interfere with the oxygen-carrying capacity of the erythrocytes (114) or with the blood flow (183). Earlier reports indicated that gelatin shortens the clotting time (3), but this was probably due to the high calcium content of these preparations. Recent studies by Koop (144) show that the coagulation mechanism is not impaired. Gelatin infusion in normal subjects causes slight and transient increases in the venous and arterial pressure and in the cardiac output (114, 142). Holt was not able to correlate the increases of plasma volume with those of cardiac output; such increases are more marked in chronically ill patients (75). Four hours after infusion of a 5 per cent gelatin solution Jacobson (126) found 70 per cent of the injected fluid still retained in the blood.

Opinion is divided as to whether gelatin is metabolized in the body. Robscheit-Robbins (220) believed that gelatin could be incorporated into body proteins when given by mouth, but her results with intravenous infusions were equivocal. Brunschwig (34, 36) concluded that gelatin was metabolized on the basis of nitrogen balance studies and increased urea excretion, but in similar studies Hoffman and Jacobson (125) came to quite the opposite conclusion. Kozoll (148) thought that gelatin was not metabolized because of its nearly total recovery in the urine in his studies.

Most authors report that gelatin infusions do not cause any histologic alterations (112, 115, 125, 143, 145, 198, 266). Hueper (116), on the contrary, was able to produce sclerosing vascular lesions in dogs by the infusion of large amounts of 10 per cent gelatin solution. On repeating these studies with 4 to 6 per cent solutions, Morehead could not reproduce Hueper's results. Skinsnes described a "gelatin nephrosis" with changes similar to those noted after massive sucrose administration (10), but these alterations are reversible and disappear within 120 hours. Koop (145) reviewed the question of renal toxicity due to gelatin, and emphasized the lack of evidence for severe functional impairment. In many other studies with gelatin no morphologic changes were detected. Most recently, Ravdin (213) has mentioned that in dogs given 112 daily gelatin infusions there were no histological alterations 7 days after discontinuation of the infusions. Also, after eight massive daily infusions of 1,000 to 2,000 cubic centimeters there was no change of glomerular or tubular function.

Robscheit-Robbins suggested that the infusion of gelatin for 1 to 2 weeks may impair plasma protein production, but the evidence is not entirely clear-cut. As previously mentioned for acacia, gelatin retained in the circulation might lessen the stimulus for the addition of new plasma protein without interfering with its production. In Koop's (144) study the fall of native serum protein was reciprocally related to serum gelatin concentrations. Studies on hepatic function have either been negative or shown only transient alterations (144, 166, 199, 245).

OXYPOLYGELATIN (OPG)

After extensive chemical investigation, Campbell observed that condensation of gelatin with glyoxal and subsequent oxidation with hydrogen peroxide gives a product that gels only at temperatures below 18° C. The resultant material has been named oxypolygelatin.

A recent preparation was reported to have a weight average molecular weight of 31,200 with about 35 per cent of the molecules under 10,000 and only 6 per cent over 100,000 (77). Campbell found it an adequate volume replacement for rabbits bled one-third of their blood volumes. He observed that retention of OPG averages 37 per cent at 5 hours and 14 per cent at 24 hours. The average molecular weight of OPG excreted in the urine 6 hours after infusion in this study was 15,000, while that of the infused material was 45,000, which demonstrates again the selective excretion of smaller molecules. In normal man, Higgins found 75 per cent retention of the infused dose by the end of infusion and 9 per cent in 24 hours. Feigen used a material with a number average molecular weight of 24,000 in rabbits and recorded a 24 hour retention of from 7 to 17 per cent; he believed that this retention was independent of the dose and the amount of hemorrhage. In his experiments 59 per cent of the administered fluid was still in the circulation at 5 hours and 32 per cent at 24 hours, in contrast to the corresponding figures of 36 and 27 per cent for normal saline solution. In a study of normal human beings, Elder noted that there was greater retention of both fluid and OPG when the replacement was made for hemorrhage rather than when the material was given to an unbled subject.

Early preparations of OPG possessed nephrotoxicity for the rat, as evidenced by proteinuria,

azotemia, and glomerular and tubular damage. In a recent study of this problem Lippman noted that OPG administration lowered the threshold for hemoglobin excretion. His observations suggested that the small OPG molecules might saturate the tubular epithelium mechanism for protein reabsorption. Higgins reported that recent preparations of OPG do not induce proteinuria in human beings, although they apparently still do so in rabbits.

Higgins observed erythema, urticaria, itching, or joint swellings in 5 of 42 normals, although all of the reactors received the same lot of material.

OPG causes an increase in the sedimentation rate, which the interesting studies of Crismon suggest may be due to the formation of hydrogen bonds between the erythrocytes and the gelatin molecules.

ISINGLASS

The original objections to hide gelatins led to the introduction of isinglass by Taylor (253, 254) in 1941. This protein was obtained from the bladder of certain fish and therefore the danger of spore transmission was eliminated. In 7 per cent concentration it is approximately iso-oncotic with normal plasma. The original communication suggested that it is successful in reversing experimental hemorrhagic shock, but subsequent studies indicated that it is inferior to other gelatins (274) and that it gives a 14 per cent reaction rate in man (209).

DEXTRAN

Dextran was first encountered as an undesirable side product in the German sugar beet refining industry. It is formed by action of the nonpathogenic contaminating bacterium Leuconostoc mesenteroides on sugar slime. In 1941 Groenwall and Ingelman (87) became interested in the possibility of using dextran as a plasma expander. It is a large polysaccharide composed of glucose units that are joined in branched chains of different glucosidic linkages. The native, high polymer dextran is extremely toxic, but after acid hydrolysis to a suitable molecular weight range it is safe for intravenous injection. Extensive studies have led to its acceptance for routine clinical use in Sweden. In this country, there has been growing interest in improving the bacteriological production of dextran. Recently, it has been possible to separate an enzyme from various anaerobic bacteria (104) and from aspergillus (43) which is capable of hydrolyzing dextran directly. It has also been possible to extract a sucrase from Leuconostoc mesenteroides, which in a cell-free medium will catalyze the direct production of dextran from sucrose (104, 141, 263). This offers promise of improving the commercial production and is already under trial (184).

There is no agreement at present on ideal molecular weight specifications. The products now in use have the following number average molecular weights: (1) Swedish 34,000, American 41,000, and English 73,000. These differences materially affect the results obtained by various investigators. Twenty-four hours after its administration, 25 per cent of an early, partially hydrolyzed American product was found by Goldenberg (78) in the blood of normal dogs. After hemorrhage a corresponding figure of 30 per cent was noted in our laboratory (88). Dextran retention in dogs which have been hemorrhaged is not significantly different from that in nonhemorrhaged animals (88, 172). Ingelman stated that Swedish dextran is completely cleared from the blood about 5 days after injection, while Bloom (22), using the American product and a more sensitive chemical method, found detectable quantities in the circulation as long as 21 days after injection. A urinary excretion of 40 to 50 per cent of the infused radioactive material has been reported to occur in the first 12 hours following the infusion of radioactive dextran (153). In 60 to 70 hours 37 to 72 per cent (average 60 per cent) can be recovered in the urine (2). Bloom (22) reported that the percentage of excretion is independent of the dose.

In 9 hours Engstrand found that 28 per cent of a 2.4-gm. dose is excreted into the small intestine through the pancreatic and intestinal juices, but not through the bile. Gray (84) and Burson, on the contrary, found no evidence of gastrointestinal excretion.

Early studies showed that liver, intestinal, and other tissue extracts do not metabolize dextran, but that incubation with feces results in its breakdown (61). More recently Szepsenwol demonstrated that dextran, unlike glycogen, is not metabolized when incubated with embryonic skeletal muscle explants. Groenwall (86) suggested that the more rapid clearance of dextran from the blood when the basal metabolic rate is artificially elevated by thyroid administration is evidence for its metabolism, but alterations in renal excretion might also explain these results. Stronger evidence for metabolism was obtained in our laboratory (84) when it was demonstrated that a fixed urinary dextrose/nitrogen ratio was elevated after the administration of dextran to phlorhizinized, starved dogs. Recent studies with radioactive dextran have shown conclusively that at least part of the administered dextran is metabolized. The elimination of radioactive carbon dioxide 3 days

after C_{14} labeled dextran administration is 15 per cent in mice (42), 8 to 35 per cent in rats (153), and 5 per cent in dogs (257). In man, Lathrop has noted a corresponding figure of 11 per cent at 4 days. Although radioactive material has also been recovered from carcass protein and fat in our laboratory, the exact metabolic pathways are not yet established. The biological half-life for the carbon skeleton of C_{14}-tagged dextran is 6.1 days in mice (83).

The hemodilution caused by dextran infusions results in a decreased erythrocyte count, hematocrit, and total protein concentration that is maintained for 6 to 24 hours (21, 121, 255, 275). According to Thorsen (258), the albumin fraction is decreased more than the globulin. Despite this lowering of total protein concentration, the tensile strength of healing wounds in rabbits is not decreased (259). Dextran is a good agent for restoring the circulating volume, maintaining the blood pressure, and promoting survival in experimental shock (201, 260, 265, 268, 273) as well as in human shock (278). With dextran administration, the increase in the sedimentation rate has been shown to be a result of molecular size, molecules smaller than 60,000 having little effect (95, 258). There is an increased aggregation of erythrocytes which, however, does not interfere with oxygen transport (258).

Infusions of dextran into normal subjects result in a temporary increase of cardiac output, stroke volume, right auricular pressure, pulmonary artery pressure, and venous pressure (280). An infusion of 500 cubic centimeters increases the cardiac output on an average of 38 per cent of the control values. These measurements all return to normal in 1 to 2 hours. The cardiac output increases cannot always be correlated with elevation of the right auricular and pulmonary artery pressures (73). Changes in the arterial pressure are minimal (5 to 15 mm. of mercury), and the hepatic flow and splanchnic oxygen consumption do not appear to be significantly influenced (190, 256). Wilson (279) found that the increase in plasma volume lasts for 6 to 12 hours with an infusion of 500 cubic centimeters. Meyer (179), using P-32 labeled erythrocytes to measure the blood volume, reported a maximum increase from 960 to 2,850 c.c. after an infusion of 500 cubic centimeters. This was at variance with the hematocrit changes and its accuracy must be doubted. In a large series of Swedish patients given dextran therapeutically, Thorsen (258) recorded a reaction rate of only 0.8 per cent. The incidence of reaction to transfusion of fresh blood during the same period was 8.2 per cent. In England, a survey by the Medical Research Council of 1,647 subjects who had received dextran infusions revealed a reaction rate of only 1.88 per cent (171). In 1 instance there, dextran was suspected as the immediate cause of death due to anaphylactic shock, although the evidence for this was not decisive. On our service we observed that the Swedish product caused a reaction rate of approximately 40 per cent when given to normal, healthy adult males (210). Kabat (130) recently enlarged this study to include 100 subjects, and found that the incidence of systemic allergic reactions to clinical Swedish dextran did not differ in individuals who had received routine Army immunization from those in individuals not so immunized. The over-all reaction rate in this study was 51 per cent, and a high correlation between cutaneous sensitivity to certain native dextrans and the incidence of systemic allergic reactions was observed. The American product, on the other hand, rarely caused reactions. Itching, urticaria, joint pains, headaches, vasomotor collapse, and respiratory distress have been seen in all degrees of severity, but these are all minimized by anesthesia and shock.

The nature of these reactions has not been completely clarified, although the reactions appear to be on an allergic basis. It has been known for some time that dextran may act as a haptene (65). Kabat (131) found that patients who have been given dextran infusions can develop precipitins for Leuconostoc mesenteroides. Warren noted that 17 per cent of normal human sera will agglutinate Leuconostoc mesenteroides in titer of 1:8 or higher, and this figure increases to 30 per cent in persons given infusions. Sugg (250) demonstrated that crude dextran can be precipitated by types 2, 12, and 20 antipneumococcal sera. It has been shown further that cross reactions occur between dextran and Salmonella, E. typhosa, and streptococci as well (105, 106, 192, 251, 285).

Using a poorly degraded dextran, Goldenberg and Turner reported renal histological changes of "hydropic degeneration" similar to those seen after the administration of sucrose and gelatin. These changes were found only in animals examined within 2 days after the last injection. Hartman (96) described similar transient changes in the kidneys as well as in the liver and lymph nodes of mice. Improved histochemical technique has demonstrated that the foam cells seen as part of these transient alterations contain dextran (188).

Most recent studies, however, indicate that there are no histologic abnormalities that can be attributed to dextran. Bloom (21) found no evidence of functional renal impairment as deter-

mined by urinalysis, the phenolsulfonphthalein test, the serum nonprotein nitrogen findings, and the creatinine clearance, and others have noted that repeated administration of dextran does not impair the filtration rate or renal plasma flow in normal dogs (212) or in human beings (20, 74). Michie (180, 181), however, gave 6,000 cubic centimeters of dextran to 6 patients and noted that the tubular excretory mass (TmPAH) is depressed at 4 days after the last injection. He suggested that this may represent significant renal toxicity since it occurs after dextran excretion and, therefore, competition for tubular enzyme systems has virtually ceased. Glomerular filtration and renal plasma flow were not impaired in these subjects. Juster also noted a temporary depression of TmPAH in a similar study of hemorrhaged dogs which returned to normal values by the ninth day after infusion.

POLYVINYLPYRROLIDONE (PVP)

During the early part of World War II, Hecht (102) of the Bayer Company in Germany was interested in developing a synthetic, water-soluble polymer for use as an expander. PVP resulted from their research. It is readily prepared from the reaction between acetylene, ammonia, and formaldehyde under pressure. In Germany, France, England, and the United States, PVP is variously known as periston, kollidon, subtosan, and plasmosan. The product originally prepared by Hecht had a weight average molecular weight of 25,000, with a range of 5,000 to 50,000. The two American preparations now available have average molecular weights of 56,000 and 33,000. According to Janeway, PVP molecules are narrower (16Å) than those of plasma protein (38Å albumin and 44Å gamma globulin) (127). Its dimensions are roughly the same as those of gelatin, pectin, and dextran.

The data on PVP excretion (Table I) vary considerably because of the different techniques used for quantitation and differences in the molecular weights of the preparations used in various studies. The early investigators could account for an excretion of only 50 per cent of the injected material in 5 days (7, 8, 14). More recently, Thrower reported a 75 per cent urinary recovery, 50 per cent of which occurred in the first 24 hours. After the injection of a 3.5 per cent solution Cournand recovered from 50 to 60 per cent in 72 hours. There is agreement that most of the excretion takes place quite rapidly. Murat, for instance, reported from 33 to 54 per cent excretion in 2 hours and Welt (277), Fine (72), and Cournand a similar excretion in the first 3 to 6 hours (Table I). In infants, Hecht (101) found that complete disappearance from the serum occurs only after 15 to 20 days.

The relationship between excretion and molecular weight is well established by the work of Fine (72), Cannan (276), and Van Slyke (Table I). Warner has made a careful and interesting analysis of this and other work in order to relate the amount of circulating PVP at different time intervals to the amounts of excretable and nonexcretable material administered. There is a sharp cutoff of renal excretion at molecular weight 35,000 to 40,000 as determined by fractionation of the urine samples. It was apparent that material below 15,000 molecular weight is ineffectual as a volume expander because of its rapid urinary excretion and loss to extracellular fluid. Even the highest molecular weight fraction of excretable PVP is distributed into extracellular fluid so rapidly that it can make no sustained contribution to plasma oncotic pressure. It is interesting, in this connection, that narrowly fractionated PVP of about 35,000 molecular weight is as effective in maintaining plasma volume expansion as unfractionated material of higher average molecular weight (70).

In Van Slyke's study, 35 per cent of the high molecular weight material and 70 per cent of the low molecular weight material were excreted in 8 days.

PVP enters the bile in insignificant amounts (71, 225), but it does appear in the mother's milk and fetal blood (196). As much as 13 per cent may be eliminated through the bowel (267).

PVP infusion causes an aggregation of erythrocytes (91) and an increase in the sedimentation rate (147, 189), as do the other plasma expanders. When from 7 to 10 per cent PVP is administered the sedimentation rate increase lasts 24 hours (8). PVP has successfully reversed various types of experimental shock (29, 102, 163, 191, 206, 219). There is no prolongation of the bleeding or clotting time after PVP infusion (262).

This material has some interesting properties that are not related to its use as a plasma expander. Like albumin, it can chemically bind certain molecules such as dyes and bilirubin and can thereby effect their renal excretion. This is referred to by Schubert (226, 227, 228, 230) as a "vehicle function." Because of its ability to bind many different types of molecules, PVP may be used to retard the absorption of penicillin (223), insulin (156, 165), and various other drugs (18, 55, 204). It also appears to be capable of binding toxins, including diphtheria and clostridial toxins, and also viruses (135, 229).

Recent literature indicates that PVP causes no reactions when administered to man (11, 262, 283). In France, however, shocklike reactions in infants under 2 years of age have been noted (57). Hecht (102) and others (164, 269) have commented on the peculiar shocklike reaction that PVP causes in dogs.

The occurrence and significance of storage phenomena in animals and man after PVP infusions are matters of considerable controversy. Although Korth (147) found no evidence of storage in 3 patients, most reports describe storage phenomena in the form of vacuolated macrophages in the liver, spleen, lungs, blood vessels, and lymph nodes (8, 13, 14, 76, 193, 224). The stored material has not been proved to be PVP, nor is the storage associated with demonstrable damage of the parenchymal cells. Ammon (8) found that these histologic changes persisted in the liver for as long as 41 weeks after cessation of treatment. Van Slyke's studies with radioactive PVP did not show any abnormal accumulation in the liver, but Fine (71), on the contrary, found that in the liver and spleen the concentration of PVP was two to five times that found elsewhere. By radioautographic study (71) the stored PVP has been shown to be concentrated in the reticuloendothelial cells rather than in the parenchymal cells. Over-all mouse carcass retention in 58 days is as high as 16 per cent with the K-30 preparation (244). Storage is roughly proportional to the molecular size. There is no evidence that PVP can be metabolized (244).

Pellerat (203) and Thrower observed "hydropic degeneration" in the renal tubules. This was seen at 14 but not at 21 days after injection, and in both studies the swelling of the proximal tubules did not appear to be associated with death of the cells as the brush border, mitochondria, and nuclei were intact. Langeron noted that the urea and creatinine clearances show small but consistent depression in the first hour after injections of 25 per cent PVP in man. These changes were ascribed to the increased oncotic pressure, which would oppose glomerular filtration. Others have reported that there is no adverse effect on either the renal or the hepatic function (203, 283).

PECTIN

Pectin is a high molecular weight polysaccharide, the units of which consist chiefly of galacturonic acid esterified with methanol. It is readily available from fruits and vegetables.

The literature on pectin has been thoroughly reviewed by Joseph. Natural pectin has a molecular weight of 100,000 to 250,000, but the molecules can be broken down to any desired level by autoclaving, and properly autoclaved pectin has a molecular weight of 40,000 to 60,000. In human beings, Kozoll (150) found a 15 per cent urinary excretion of pectin by the end of the infusion and a total of 30 per cent in 72 hours.

In concentrations of 0.75 per cent to 1.5 per cent pectin has been found useful for blood pressure and blood volume restoration in shock (97, 169, 176, 178, 182). It has been reported that the injected fluid is retained in the circulation for at least 4 hours after infusion of a 0.5 per cent solution in man (69, 124). Jacobson (124) noted that 23 per cent was still retained at 24 hours. The blood is entirely cleared of pectin in 7 days (37). The usual increase of sedimentation rate and evidence of hemodilution seen with other colloids also attend pectin infusions.

Hartman's initial experience in 1941 suggested that pectin is not antigenic in dog or man. McClure and Jacobson (124), however, noted purpuric reactions in their cases, and the latter author also reported a case of joint involvement which he attributed to the combination of the dye T-1824 and pectin. There have been several reports of histologic alterations suggesting storage in the liver, bone marrow, blood vessels, lungs, kidneys, and spleen (118, 207, 217). Recently, however, Bryant and Small reported that massive doses of 6 per cent autoclaved pectin cause no abnormalities in rabbits if the animals are given autopsy examination later than 4 days after the last injection. Heuper (118) also found that autoclaving eliminated storage phenomena in all but 1 rabbit.

GLOBIN

This natural protein, readily available from outdated banked blood, has been suggested by Strumia (248, 249) as a useful expander. It is the only human blood derivative that promises to meet the practical needs for procurement and storage previously outlined. Unlike foreign macromolecular materials, it does not increase the sedimentation rate. A 16-gram unit of this material is equivalent in its effects to 250 milliliters of plasma, and a 16 per cent solution is more than the osmotic equivalent of a 25 per cent solution of human serum albumin (206). It has a molecular weight of about 34,000 and will expand plasma volume above control levels 24 hours without shock and longer with shock in human beings (246). It is nonantigenic for rabbits, mice, and human beings, but is anaphylactogenic for the guinea pig and causes reactions in the dog (143). Strumia recorded its use in 108 human beings in whom 57 grams was the largest single dose given,

and there were no reactions (249). He believed that globin can increase the circulating plasma protein and maintain positive nitrogen balance, although proof for such utilization is not convincing (247).

CASEIN DIGESTS

There has been some interest in the use of casein digests as plasma expanders in Europe. These materials can be prepared in 15 per cent solution so that they exert five times the normal osmotic pressure of whole blood (111). As protein digests they possess the theoretical advantage of providing a source of amino acids for nutrition. The composition and concentration of the digests used by different authors vary widely. Casein digests have been reported to be useful in the treatment of experimental and human shock (67, 110, 111). Brinkman believed that they contain a vasoconstrictor component, and it has been suggested that this component was responsible for their successful use in individuals with shock refractory to blood transfusion. Casein digests give rise to precipitin formation but Fedorov stated that they are not anaphylactogenic in man or animals. Brinkman reports that casein digests can maintain newborn infants in positive nitrogen balance. While this information is interesting, sufficient data are not available for the recommendation of current preparations.

ASCITIC FLUID

In 1938, Davis (51) suggested the use of ascitic fluid as a volume expander and found that it could be stored for as long as 5 months without loss of its effectiveness. Maes established a bank at Charity Hospital in New Orleans, and his pooled ascitic fluid contained from 2.0 to 3.19 per cent of protein. It afforded good results in replacement of 30 to 50 per cent hemorrhage in dogs, and 22 infusions given to patients are recorded. Since ascitic fluid has an impractical source of origin, there has been minimal interest in its use in recent years.

CADAVER BLOOD

In 1927, Russian investigators suggested the use of cadaver blood for transfusion purposes (195). The formed blood elements remain viable up to 5 hours after death, but the danger of contamination by bacterial toxins has discouraged its use.

HEMOGLOBIN

While there are certain obvious advantages in attempting to use the protein hemoglobin, free of the cell stroma, as an expander, this approach has received surprisingly little attention. Hemoglobin has a molecular weight of 68,000 and in a 12 to 14 per cent solution it has an osmotic pressure greater than that of plasma protein. It passes rapidly into the lymph and may be detected in cervical lymph 30 to 45 minutes after injection (100).

In 1927, Hartridge demonstrated that free hemoglobin in solution takes up oxygen faster than when it is contained in erythrocytes. When added to the perfusion fluid of various organs, it prevents edema formation (5). Amberson (4, 6) was the first to use hemoglobin in Ringer's solution as a blood replacement agent, and he found that cats, dogs, and rabbits do well for many hours after almost complete replacement of their blood with hemoglobin-Ringer's solution. The blood pressure could be well maintained in these experiments, and the oxygen consumption of the whole animal as well as that of heart-lung preparations was unaltered. In the absence of erythrocytes, however, the hemoglobin is rapidly converted into methemoglobin. Animals died from asphyxia when the concentration of hemoglobin fell below a critical level of 3 per cent. The capsules and tubules of the kidney became filled with methemoglobin, but the significance of these changes is not yet settled (3, 281). The questionable renal damage and the untoward reactions of the earlier preparations were not seen with later pure hemoglobin solutions if pre-existing tubular damage was absent (53, 117, 281), although Brandt has recently reported similar deterioration of renal function in both normal individuals and in subjects with kidney disease after the infusion of 6 per cent hemoglobin solutions. In hemorrhaged dogs Hamilton (93) reports that although the urea clearance may be depressed to as low as 25 per cent of the control value, with replacement by 7 per cent hemoglobin solutions it has returned to normal in 5 or 6 days. Corcoran's studies of the crush syndrome shed considerable light on the mechanism of renal damage associated with hematin pigment excretion in this condition, and are probably relevant to the corresponding problem with hemoglobin infusions.

After injections of hemoglobin solution the sedimentation rate is increased and a hemoclastic crisis is followed in 24 hours by leucocytosis (117). No casts are found in the kidney, but deposits of hemoglobin pigment can be seen in the liver and spleen.

POLYVINYL ALCOHOL

Hueper (119) gave 14 to 60 grams of a 5 per cent polyvinyl alcohol solution to rabbits and dogs over a period of 523 days. In addition to the

expected hemodilution and increased sedimentation rate, he observed marked impairment or complete suppression of the clotting mechanism. The material was also retained in the blood, spleen, liver, kidney, and lymph nodes for a long time. In the larger blood vessels it led to the formation of "polyvinyl alcohol atheromas." The molecular weight of the particular material used in this study was not recorded. Roome used a 2.8 to 3.8 per cent solution, which is iso-oncotic with the blood, and found that the blood concentration falls one-half of the initial value in 18 to 24 hours. He used a 10 per cent solution with an average molecular weight of 17,000, and failed to reproduce the storage or blood phenomena previously mentioned. This material afforded good blood pressure restoration and survival in dogs subjected to hemorrhage. Locke found polyvinyl alcohol to be best of several substances used in the treatment of tourniquet shock in rats, but Scott found it inferior to saline solution.

METHYL CELLULOSE

Hueper (120) used a 0.25 per cent solution of methyl cellulose, a methyl ether of cellulose with an average molecular weight of 50,000, in the treatment of experimental shock. He found it effective, although there was evidence of storage in the liver, kidney, and spleen. It is not anaphylactic for the dog or rabbit.

ANIMAL BLOOD PRODUCTS

In 1940, Wangensteen reported a 15 per cent reaction rate in 66 patients given small quantities of bovine plasma. In 1941 Keyes summarized the rather extensive experience of the Minnesota group with various animal albumins by expressing the discouraging belief that it is impossible to fully deantigenize animal protein products. He did believe, however, that skin testing is a guide to sensitivity and that the albumin fraction gives fewer reactions than the globulin fraction or native serum. Cohn extended these studies by fractionating and purifying bovine plasma and in a study of 100 individuals observed delayed reactions in the form of serum sickness. Several other authors report encouraging results in their attempt to deantigenize animal plasma or albumin fractions for human use (15, 24, 50, 56, 157, 170, 177). In 1946, however, Armstrong stated that animal blood products were not used as expanders during World War II and that they are not recommended by the Sub-Committee on Shock of the National Research Council. In a series of 410 patients, State observed reactions in 12.2 per cent, some of which were severe. Skin testing with bovine serum albumin before infusion failed to predict reactors.

Animal blood products behave metabolically like the recipient's own plasma protein. Aside from antigenicity, these products would be eminently suitable as expanders (107).

MISCELLANEOUS

There are a number of materials which are in the early developmental stage as prospective volume expanders.

Polyglucose. This material has been recently proposed as an expander, and its evaluation is, therefore, incomplete. Parkins (200) and Porter (208) found a good early blood pressure response in dogs subjected to hemorrhage, but this was not sustained beyond 30 minutes. Although polyglucose has an average molecular weight of about 55,000 and from 60 to 70 per cent of the initial plasma concentration is maintained for 3 hours, from preliminary experience it is apparently no better than saline solution as a volume expander. It is of immunological interest that this polysaccharide will partially precipitate antibodies to dextran (130).

Subsidon. This is a preparation of rutin in modified Ringer's solution which was first developed in Germany (151), where it has already had a fairly extensive clinical trial. It is not a true volume expander in the sense that this term has been defined in this report, as it is not a colloidal or macromolecular solution. The basis for its proposed use in shock is that rutin has been reported to decrease capillary permeability and, therefore, the circulating fluid loss. Since this supposition is not well founded, it is not surprising that in an initial study Bollman (27) found it equivalent only to Ringer's solution as a volume expander.

Okra (17), colloidal salts (16), and amino acid polymers (23) are in the laboratory state of consideration.

MIXED STUDIES

As mentioned, the many varying aspects of experimental conditions and differences in the type of products used make a comparison of results with individual expanders misleading. In a few instances comparative studies were performed with the conditions of the experiment standardized as much as possible.

Parkins (201, 202) bled dogs to a certain level of hypotension, replaced the volume bled with one of several expanders or blood derivatives, and then bled the animals to the same point as in the original bleeding. The ratio of the volume of

original bleeding to the volume of the second bleeding was termed the "bleeding volume index." This index was 95 for whole blood, 87 for dextran, 67 for PVP, 84 for P-20 gelatin, 83 for fluid gelatin, 81 for OPG, 65 for P-180 gelatin, 54 for saline solution, 40 for glovin, 70 for dog plasma, and 88 for human albumin. It is likely that the "bleeding volume index" represents, to a large extent, the relative efficacy of volume expansion. By this criterion, dextran is the best of the synthetic expanders and, indeed, as good as albumin. When, in the same study, the period of hypotension was prolonged, the figure of 66 for fluid gelatin was the highest of the group, indeed higher than that of 58 for whole blood. With a similar technique in rabbits in our laboratory (211), it was noted that dextran gives a higher bleeding volume index than OPG; however, the best results were obtained with rabbit plasma. On estimating the blood volume in hemorrhaged rabbits, Bollman (28) also found that 6 per cent dextran was more effective for volume expansion than corresponding replacement with 6 per cent gelatin, 6 per cent acacia, or 3.5 per cent PVP. However, it was determined that in proper concentration and dose, these could all be made equivalent in their effects.

There have been several studies in which restoration of the blood pressure and blood volume and survival from shock were used as criteria for comparison. With a rapid hemorrhage technique (89), it was found that in volume replacement with dextran, OPG, and dog plasma all of these substances assure a similar survival in dogs and are superior to saline solution in this respect. Although the restoration of blood pressure and blood volume could not be correlated with survival, dextran was the best of all four materials in both of these respects during the early treatment period. In animals given autopsy examination within 48 hours after infusion, the only finding related to plasma substitute infusion was a mild type of gelatin nephrosis in the oxypolygelatin-treated animals. This was no longer present after 12 days. Using a similar technique, Ivy compared various forms of acacia, two gelatin products, saline solution, dog serum, and albumin in dogs. He noted that treatment with the artificial expanders did not prevent a mortality of 40 per cent or greater; the best results were obtained with serum, which limited the mortality to 26 per cent.

With a slower bleeding technique in rabbits (211), we found that volume replacement with OPG affords better survival than either dextran or rabbit plasma. Govier also obtained his best survival figures with "plasmoid," a 2.5 per cent gelatin preparation, and found Swedish dextran barely more efficient than saline solution, which gave the worst results; the results with 5 per cent "plasmoid," PVP, and OPG were intermediate. Narat reported essentially the same survival figures with PVP and Swedish dextran, both of which were distinctly superior to the control (untreated) figure. In guinea pigs subjected to hemorrhage, Morrison recorded a mortality of 100 per cent in the group treated with saline solution and complete survival in those treated with whole blood and serum albumin. PVP, dextran, and "plasmoid" gave intermediate results, but, of these, plasmoid gave the best. A similar technique applied to rats showed roughly comparable results. Knutson compared the ability of dextran, gelatin, acacia, PVP, and saline solution to maintain plasma volume in animals subjected to hemorrhage, and found their relative efficacy to be in the order mentioned. Myers also found that dextran maintains the plasma volume better than PVP. In cats subjected to hemorrhage, Loewen found that replacement with 3.5 per cent PVP gave survival figures as good as those following the use of whole blood or its derivatives. In tourniquet shock of dogs, Hamilton (92) obtained survival figures for isinglass and polyvinyl alcohol which were intermediate as compared with the results for saline solution (33 per cent) and plasma (92 per cent). In a similar study in rats, Locke found polyvinyl alcohol superior to isinglass.

The effects of 5 per cent OPG, 6 per cent dextran, saline solution, and 4 to 5 per cent albumin in saline solution on the excretion of water and electrolytes were compared in our laboratory (212). These materials all increase the excretion of water and electrolytes to approximately the same degree. It appears that dextran, OPG, or PVP have no specific diuretic effect. Bridger observed a specific diuretic effect of unautoclaved gelatin, but the autoclaved product induced a response similar to 0.9 per cent saline solution.

We (89) have measured the filtration rate and plasma flow in dogs subjected to massive hemorrhage and treated with OPG, dextran, plasma, and saline solution. The expanders restore and maintain renal function as well as does plasma. Dextran, in fact, restores these functions above control levels.

CLINICAL EXPERIENCE

Expanders have been used clinically for two purposes: namely, for the treatment of shock and the treatment of edema due to hypoproteinemia in such conditions as the nephrotic syndrome.

The reported studies may give the clinical history, determinations of the blood volume, blood pressure, pulse, hematocrit, and total protein concentrations, and the descriptions of the clinical response of shock to therapy. It is likely that all materials capable of expanding the blood volume for a sufficient length of time possess the same potential usefulness and are subject to the same clinical limitations. The expanders that will eventually find a permanent place in the treatment of shock will probably be selected on the basis of low toxicity, absence of storage phenomena, and ease and low cost of manufacture. By these criteria gelatin, dextran, and PVP have shown the greatest promise, and each has been considered for stockpiling by the National Research Council.

Gelatin. Koop (142) and his coworkers gave gelatin to 100 patients and concluded that it is an effective agent in the treatment of at least the early stages of hemorrhagic shock. Following major surgical procedures, gelatin produced a response comparable to that of plasma. Fletcher and his coworkers subjected volunteers to 20 per cent hemorrhage and then gave infusions of gelatin; they concluded that gelatin is an effective agent in restoring and maintaining the blood volume and in abolishing the symptoms that result from acute hemorrhage. Seldon and his coworkers observed favorable responses in various types of shock in 400 surgical patients, and Kozoll (149) reported a similar experience. Evans (64), after studying 67 patients with traumatic shock and 28 patients with burn shock, concluded that "lightly degraded gelatin solutions appear to be as effective and safe as plasma in the management of these types of clinical shock." Hicks resuscitated 1 patient with an intra-arterial infusion of Knox P-20 gelatin without untoward effect.

Dextran. An extensive clinical experience has been recorded by Ingelman and Thorsen (258), who have recently reviewed the results of the administration of 40,000 bottles of dextran in Sweden up to February, 1949. These were quite satisfactory, and, as mentioned before, dextran is now routinely used in Sweden. DeBakey carefully studied 20 patients with wound shock and concluded that with 20 to 35 per cent blood volume deficits dextran may be adequate as the sole replacement fluid. With blood volume deficits greater than 35 per cent, dextran is effective initially, but the severe anemia that follows its use must subsequently be treated with whole blood. Bohmansson and Rosenkvist found that dextran is a satisfactory replacement solution in shock due to burns. The 11 patients with second and third degree burns reported by Rosenkvist were well managed solely with dextran. Evans (62, 63) supports these observations and we concur. In Britain, the experiences of Bull and Arden are in agreement with the favorable results of others.

PVP. This substance was used in the treatment of German casualties during World War II, but there is no dependable record of this experience. Scattered reports suggest that PVP is an effective replacement solution in the treatment of shock. To date, investigative efforts in America have been confined to the laboratory and PVP is not yet in wide clinical use. Zollinger (284) treated 42 patients with shock or simple blood loss, and the initial response was satisfactory in all but 3 cases. Those failing to respond expired in every instance despite plasma and whole blood therapy.

SUMMARY AND CONCLUSIONS

1. The plasma expanders are macromolecular colloid solutions which can be stockpiled for use in the emergency treatment of shock should the supply of whole blood become inadequate.

2. While there is agreement on the general requirements to which an expander must conform, the optimal molecular specifications have not been defined. All of the proposed substances are mixtures of different-sized molecules, of which the average molecular weight is generally adjustable. The outstanding unsolved problem is that of obtaining a narrow optimal molecular weight range. Small molecules leave the circulation too rapidly to be effective for volume expansion and large ones may be permanently stored.

3. At present, dextran, the gelatins, and PVP best meet the existing requirements. Dextran's chief disadvantage is the reactions (mild) that occur in human beings, but these are minimal with the American product. Modified gelatins with extremely low gel points are being produced. The most recently modified PVP does not cause storage phenomena in animals and awaits detailed clinical evaluation. It is expected that future research efforts will answer the remaining objections.

4. It is likely that when the optimal molecular specifications are defined, dextran, the gelatins, PVP, and perhaps other products, when fitted to these specifications, will be comparable in their effects and equally suitable expanders.

The authors wish to acknowledge the kind assistance of Dr. Eric Reiss in editing the manuscript and of E. W. Cockrell, Ruth W. Downs, and Clay Dugas, in the preparation of the manuscript.

BIBLIOGRAPHY

1. *ABELSON, P. H. Methods and results of chemical and physical characterization of commercial solutions of dextran. Report to Working Conference on Dextran at Peoria, Illinois, p. 54, July 9, 1951.
2. *ALLEN, J. G., CARGILL, W. H., and TERRY, R. Radioactive dextran. Conference on Radioactive Dextran. Report to National Research Council, p. 2, August 29, 1951.
3. AMBERSON, W. R. Blood substitutes. Biol. Rev., 1937: 12: 48.
4. AMBERSON, W. R., FLEXNER, J., STEGGERDA, F. R., MULDER, A. G., TENDLER, M. J., and PANKRATZ, D. S. On use of Ringer-Locke solutions containing hemoglobin as a substitute for normal blood in mammals. J. Cellul. Physiol., 1934, 5: 359.
5. AMBERSON, W. R., and HOEBER, R. Permeability of mammalian salivary glands for organic nonelectrolytes. J. Cellul. Physiol., 1932, 2: 201.
6. AMBERSON, W. R., MULDER, A. G., STEGGERDA, F. R., FLEXNER, J., and PANKRATZ, D. S. Mammalian life without red blood corpuscles. Science, 1933, 78: 160.
7. AMMON, R., and BRAUNSCHMIDT, G. Das schicksal von periston im organismus. Biochem. Zschr., 1949, 319: 370.
8. AMMON, R., and MUELLER, W. Der einfluss hoher peristongaben auf den kaninchenorganismus unter besonderer berucksichtigung der speicherorgane. Deut. med. Wschr., 1949, 74: 465.
9. ANDERSCH, M., and GIBSON, R. B. Studies on the effects of intravenous injections of colloids. Deposition of acacia in the liver and other organs and its excretion in the urine and bile. J. Pharm. Exp. Ther., 1934, 52: 390.
10. ANDERSON, W. A. D., and BETHEA, W. R., JR. Renal lesions following the administration of hypertonic solutions in sucrose. Report of 6 cases. J. Am. M. Ass., 1940, 114: 1983.
11. ARDEN, G. P., MANDOW, G. A., and STONEHAM, F. J. R. Plasmosan in the prevention and treatment of shock. Lancet, Lond., 1951, 1: 1099.
12. ARMSTRONG, S. H., JR. The management of blood preservation and blood substitutes. Bull. N. York Acad. M., 1946, 22: 451.
13. BARFUSS, F., and EICHLER, O. Periston bei wiederholter darreichung. Arch. exp. Path., Lpz., 1949, 206: 346.
14. BARGMANN, W. Uber milzveraenderungen nach zufuhr des blutfluessigkeitsersatzes periston. Virchows Arch., 1947, 314: 162.
15. BARSOUM, H. Calf plasma for transfusion. Lancet, Lond., 1948, 1: 346.
16. BEHRMAN, V. G., and HARTMAN, F. W. Colloidal salts as plasma substitutes. Fed. Proc., Balt., 1952, 2: 11.
17. BENJAMIN, H. B., IHRIG, H. K., and ROTH, D. A. The use of okra as a plasma substitute. Rev. canad. biol., 1951, 10: 215.
18. BENNHOLD, H., OTT, H., and WIECH, M. Uber den bindungsunterschied lebergangiger und nierengangiger substanzen an die serumeiweisskorper. Deut. med. Wschr., 1950, 75: 11.
19. BLALOCK, A., and MASON, M. F. Blood and blood substitutes in the treatment and prevention of shock, with particular reference to their uses in warfare. Ann. Surg., 1941, 113: 657.
20. BLOOM, W. L. Present status of plasma volume expanders in the treatment of shock. Arch. Surg., 1951, 63: 739.
21. *Idem. The use of dextran as a nontoxic polysaccharide for the expansion of plasma volume. Report to National Research Council, March 16, 1951.
22. Idem. Carbohydrate changes in the blood and urine following dextran administration. Plasma Substitutes Program Progress Report, National Research Council, August, 1951.
23. *BLOUT, E. R. Water soluble high polymers from naturally occurring alpha amino acids for possible use as blood plasma substitutes. Shock Bulletin, National Research Council, Subcommittee on Shock, February 13, 1952.
24. BOESEN, C. E., LARSEN, V., and NIELSEN, A. K. Properties of bovine serum heated with formaldehyde. Lancet, Lond., 1948, 1: 325.
25. BOHMANSSON, G., ROSENQVIST, H., THORSEN, G., and WILANDER, O. Clinical experiences with dextran as a plasma substitute. Acta chir. scand., 1946, 94: 149.
26. BOLLMAN, J. L. Abstract of discussion. Arch. Surg., 1951, 63: 749.
27. *Idem. Status of subsidon. Report to National Research Council, Subcommittee on Shock, February 13, 1952.
28. BOLLMAN, J. L., KNUTSON, R. C., and LUNDY, J. S. Volemic substances for replacement of blood. Arch. Surg., 1951, 63: 718.
29. BOVET, D., COURVOISIER, S., and DUCROT, R. Activite de la polyvinylpyrrolidone dans le choc traumatique experimental et sur les accidents provoques par certaines toxines microbiennes. C. rend. Acad. sc., 1947, 224: 70.
30. BRANDT, J. L., FRANK, N. R., and LICHTMAN, H. C. The effects of hemoglobin solutions on renal function in man. Blood, N. Y., 1951, 6: 1152.
31. BREWER, D. B. Renal clearances of dextrans of varying molecular weight. Proc. R. Soc. M., Lond., 1951, 44: 561.
32. BRIDGER, C. E., SMATHERS, S. E., COTTERMAN, C. W., DAMERON, J. T., and LITTLE, J. M. The diuretic effect of gelatin solutions. Am. J. Physiol., 1944, 142: 246.
33. BRINKMAN, R., EERLAND, L. D., HISSINK, L. A. G., and VEGTER, J. J. M. Hydrolyzed casein (capain) as a plasma substitute. J. Laborat. Clin. M., 1945, 30: 1034.
34. BRUNSCHWIG, A., CORBIN, N., JOHNSON, C. D. Intravenous gelatin. Ann. Surg., 1943, 118: 1058.
35. BRUNSCHWIG, A., and NICHOLS, S. The retention of intravenously infused gelatin. Observations in man. Surgery, 1944, 16: 923.
36. BRUNSCHWIG, A., NICHOLS, S., and BIGELOW, R. Intravenous gelatin for nutritional purposes. Clinical and experimental studies. Surg. Gyn. Obst., 1946, 82: 25.
37. BRYANT, E. F., PALMER, G. H., and JOSEPH, G. H. Nonaccumulation of pectin intravenously injected into rabbits. Proc. Soc. Exp. Biol., N. Y., 1942, 49: 279.
38. BULL, J. P., RICKETTS, C., SQUIRE, J. R., MAYCOCK, W., SPOONER, S. J. L., MOLLISON, P. L., and PATTERSON, J. C. S. Dextran as a plasma substitute. Lancet, Lond., 1949, 1: 134.
39. *BURSON, N., and BLOOM, W. L. Studies on the gastrointestinal excretion of dextran. Report to National Research Council, December 26, 1950.

*This report is in mimeographed form.

40. CAMPBELL, D. H., KOEPFLI, J. B., PAULING, L., ABRAHAMSEN, N., DANDLIKER, W., FEIGEN, G. A., LANNI, F., and LEROSEN, A. The preparation and properties of a modified gelatin (oxypolygelatin) as an oncotic substitute for serum albumin. Texas Rep. Biol. M., 1951, 9: 235.
41. *CANNAN, R. K. The chemical analysis and characterization of plasma substitutes. Report to National Research Council, August 1951.
42. *CARGILL, W. H., and BRUNER, H. D. The metabolism of C-14 labelled dextran in the mouse. Report to National Research Council, October, 1951.
43. CARLSON, V. W., and CARLSON, W. W. Enzymatic hydrolysis of dextran. Science, 1952, 115: 43.
44. CHRISTIE, A., PHATAK, N. M., and OLNEY, M. B. Effect of intravenous acacia on physiochemical properties of blood. Proc. Soc. Exp. Biol., N. Y., 1935, 32: 670.
45. COHN, E. J. Blood, blood derivatives and blood substitutes. Proc. Am. Philos. Soc., 1944, 88: 159.
46. COLLINS, K. R. The persistence of anthrax and tetanus spores during the process of making gelatin. Res. Lab., 1907, V. 3.
47. *CORCORAN, A. C. Crush syndrome. Symposium on Shock. National Research Council, Washington, D. C., May, 1951.
48. COURNAND, A. Studies on plasma and whole blood volume, and urinary excretion of PVP, following infusion of 1 liter of PVP, general aniline 111, 3.5 per cent. Report to National Research Council, July, 1951.
49. *CRISMON, J. M., and FEIGEN, G. A. Physiological properties of plasma substitutes. Report to National Research Council, September 15, 1951.
50. DAVIS, H. A., and EATON, A. G. Intravenous and subcutaneous administration of alkali-treated bovine serum albumin to man and lower animals. Proc. Soc. Exp. Biol., N. Y., 1942, 50: 246.
51. DAVIS, H. A., and WHITE, C. S. Human ascitic fluids employed as blood substitutes in experimental secondary shock. Proc. Soc. Exp. Biol., N. Y., 1938, 38: 462.
52. *DEBAKEY, M. E., HAYNES, B. W., and AMSPACHER, W. H. Treatment of wound shock. Symposium on Shock. National Research Council, Washington, D. C., May, 1951.
53. DEGOWIN, E. L., OSTERHAGEN, H. F., and ANDERSCH, M. Renal insufficiency from blood transfusion. I. Relation to urinary acidity. Arch. Int. M., 1937, 59: 432.
54. DICK, M. W., WARWEG, E., and ANDERSCH, M. Acacia in the treatment of nephrosis. J. Am. M. Ass., 1935, 105: 654.
55. DUREL, P., and LAROUX, P. A new retarding vehicle for drugs. Gaz. med. France, 1946, 6: 151.
56. EDWARDS, F. R. A form of bovine serum suitable for a plasma substitute in the treatment of shock. Proc. R. Soc. M., Lond., 1943, 6: 327.
57. EIRICH, F. R. Personal communication to Dr. F. D. Lawrason.
58. ELDER, J. D., JR., BARKER, H. G., and WALKER, J. M. Effect of oxypolygelatin, plasma, and 0.9 per cent sodium chloride solution on plasma volume of human subjects after hemorrhage. Fed. Proc., Balt., 1952, 2: 42.
59. ELY, J. O. The BRF blood plasma substitute and its restorative effect after acute hemorrhage. J. Franklin Inst., 1945, 239: 150.
60. ELY, J. O., and ANGULO, A. W. Experimental burns: The influence of a gelatin-glucose-salts solution on the hemoconcentration of burns. J. Franklin Inst., 1943, 235: 197.
61. ENGSTRAND, L., and ABERG, B. Excretion of intravenously administered dextran. Lancet, Lond., 1950, 1: 1071.
62. *EVANS, E. I. Gelatin. Symposium on Burns. National Research Council, Washington, D. C., 1950, 2: 83.
63. *Idem. The treatment of shock in the burned patient. Symposium on Shock National Research Council, p.XIX, Washington, D. C., May, 1951.
64. EVANS, E. I., and RAFAL, H. S. Studies on traumatic shock. V. The treatment of clinical shock with gelatin. Ann. Surg., 1945, 121: 478.
65. EVANS, T. H., HAWKINS, W. L., and HIBBERT, H. Studies on reactions relating to carbohydrates and polysaccharides. Antigenicity of dextran produced by Leuconostoc mesenteroides. J. Exp. M., 1941, 74: 511.
66. FALKENSTEIN, D. F., and JACKSON, R. L. Acacia therapy in a child with nephrosis. J. Pediat., S. Louis, 1940, 16: 701.
67. FEDOROV, N. A. New albumin blood substitutes. Brit. M. J., 1946, 2: 987.
68. *FEIGAN, G. A., CRISMON, J. M., and MARKUS, G. Physiological properties of plasma substitutes. Annual Interim Progress Report, Office of Naval Research Contract, Department of Physiology, Stanford University, March 15, 1952.
69. FIGUEROA, L., and LAVIERI, F. J. The use of pectin and other agents to prevent shock. Surg. Gyn. Obst., 1944, 78: 600.
70. *FINE, J. Twelfth Meeting, Subcommittee on Shock of the Committee on Surgery, National Research Council, Washington, D. C., p. 352, February 13, 1952.
71. *FINE, J. Distribution and excretion of periston as a function of molecular size. Periston Project Interim Report III., National Research Council, Washington, D. C., April 15, 1951.
72. *FINE, J., and SELIGMAN, A. Periston Project, Interim Report I., National Research Council, Washington, D. C., January 1, 1951.
73. FLEMING, J. W. Personal communication.
74. FLEMING, J. W., CARGILL, W. H., and BLOOM, W. L. Effects of the intravenous administration of dextran on renal function. Proc. Soc. Exp. Biol., N. Y., 1952, 79: 604.
75. FLETCHER, A. G., JR., HARDY, J. D., RIEGEL, C., and KOOP, C. E. Gelatin as a plasma substitute: the effects of intravenous infusion of gelatin on cardiac output and other aspects of the circulation of normal persons, of chronically ill patients, and on normal volunteers subjected to large hemorrhage. J. Clin. Invest., 1945, 24: 405.
76. FRESEN, O. Experiments with kollidon of various particle sizes. Arztl. Forsch., 1949, 2: 308.
77. *FUHLBRIGGE, A., HALTNER, A., JR., SAUNDERS, W. N., VAN HOLDE, K., WALES, M., and WILLIAMS, J. W. Size distribution analyses in gelatin and oxypolygelatin systems. University of Wisconsin, Department of Chemistry. Report to National Research Council, Washington, D. C., September 15, 1951.
78. GOLDENBERG, M., CRANE, R. D., and POPPER, H. Effect of the intravenous administration of dextran, a macromolecular carbohydrate, to animals. Am. J. Clin. Path., 1947, 17: 939.

*This report is in mimeographed form.

79. GORDON, H., HOGE, L. J., and LAWSON, H. Gelatin as a substitute for blood after experimental hemorrhage. Am. J. M. Sc., 1942, 204: 4.
80. GOUDSMIT, A., JR., and BINGER, M. W. Acacia in the treatment of the nephrotic syndrome. Arch. Int. M., 1940, 66: 1252.
81. GOUDSMIT, A., JR., BINGER, M. W., and POWER, M. H. Acacia in the treatment of the nephrotic syndrome. Influence of acacia, injected intravenously, on the concentration of proteins and on the colloid osmotic pressure of the serum. Arch. Int. M., 1941, 68: 701.
82. GOVIER, W. M., COLOVOS. G C., HOWES, B. G., PRESTRUD, M. C., GIBBONS, A. J., and WAGNER, E. An animal survival method for the evaluation of agents designed to restore the plasma volume. Conference on Shock Syndrome. N. York Acad. Sc., 1951.
83. GRAY, I., and SIITERI, P. K. Unpublished observations.
84. GRAY, I., SIITERI, P. K., and PULASKI, E. J. Metabolism of plasma substitute. I. Dextran (Macrodex). Proc. Soc. Exp. Biol., N. Y., 1951, 77: 626.
85. GRODINS, F. S. Gelatin as a blood substitute in shock due to limb trauma. Fed. Proc., Balt., 1943, 2: 17.
86. GROENWALL, A. Some theoretical aspects on dextran as a blood and plasma substitute. Bull. internat. Serv. sante, Liége, 1949, 22: 4.
87. GROENWALL, A., and INGELMAN, B. Untersuchungen ueber dextran und sein verhalten bei parenteraler zufuhr. Acta physiol. scand., 1945, 9: 1.
88. GROPPER, A. L. Unpublished observations.
89. GROPPER, A. L., COCKRELL, E. W., RAISZ, L. G., and PULASKI, E. J. A comparison of dextran and oxypolygelatin in the treatment of hemorrhagic hypotension. Am. J. Physiol., 1952, 169: 749.
90. GROTTE, G., KNUTSON, R. C., and BOLLMAN, J. L. The diffusion of dextran of different molecular sizes in the lymph and urine. J. Laborat. Clin. M., 1951, 38: 577.
91. GUILLOT, M., and Fiehrer, A. The effect of polyvinylpyrrolidone solution on the sedimentation rate of the blood. Sang, Par., 1948, 19: 59.
92. HAMILTON, J. I., HOAR, W. S., and HAIST, R. E. A comparison of the efficacy of different infusion media in shock. Canad. J. Res., 1946, 24: 31.
93. HAMILTON, P. B., HILLER, A., and VAN SLYKE, D. D. Renal effects of hemoglobin diffusions in dogs in hemorrhagic shock. J. Exp. M., 1947, 86: 477.
94. HANZLIK, P. J., and KARSNER, H. T. Anaphylactoid phenomena from intravascular administration of various colloids, arsenicals, and other agents. J. Pharm. Exp. Ther., 1920, 14: 379.
95. HARDWICKE, J., RICKETTS, C. R., and SQUIRE, J. R. Effect of dextran of various molecular sizes on erythrocyte sedimentation rate. Nature, Lond., 1950, 166: 988.
96. HARTMAN, F. W. Tissue changes following the use of plasma substitutes. Arch. Surg., 1951, 63: 728.
97. HARTMAN, F. W., SCHELLING, W., HARKINS, H. N., BRUSH, B., and WARREN, K. The use of pectin solution as a blood substitute, with special emphasis on plasmapheresis studies. J. Am. M. Ass., 1942, 118: 1161.
98. HARTMANN, A. F., SENN, M. J. E., NELSON, M. V., and PERLEY, A. M. The use of acacia in the treatment of edema. J. Am. M. Ass., 1933, 100: 251.
99. HARTRIDGE, H., and ROUGHTON, F. J. Rate of distribution of dissolved gases between red blood corpuscle and its fluid environment; preliminary experiments on rate of uptake of oxygen and carbon monoxide by sheep's corpuscles. J. Physiol., Lond., 1927, 62: 232.
100. HAYNES, F. W. Further observations on rapidity of passage of substances from blood to lymph in dog. Am. J. Physiol., 1932, 101: 232.
101. HECHT, G., JOPPICH, G., and WEESE, H. Peristonwirkung and -nachweiss bei exsiccatischen saeuglingen. Mschr. Kinderh., 1948, 96: 145.
102. HECHT, G., and WEESE, H. Periston, a new plasma substitute. Munch. m d. Wschr., 1943, 90: 11.
103. HECKLE, G. P., ERICKSON, C. C., YUILE, C. L., and KNUTTIE, R. E. Blood plasma proteins as influenced by intravenous injection of gum acacia. J. Exp. M., 1938, 67: 345.
104. HEHRE, E. J., and SERY, T. W. Dextran-splitting anaerobic bacteria from the human intestine. J. Bact., Balt., 1952, 63: 3.
105. HEHRE, E. J., and SUGG, J. Y. Serologically reactive polysaccharides produced through the action of bacterial enzymes. I. Dextran of Leuconostic mesenteroides from sucrose. J. Exp. M., 1942, 75: 339.
106. HEHRE, E. J., SUGG, J. Y., and NEILL, J. M. The serological activity of dextrans. New York Academy of Sciences, Conference on Shock Syndrome, November 1951, Ann. N. York Acad. Sc. In press.
107. HEYLE, J. T., GIBSON, J. G., II., and JANEWAY, C. A. Studies on the plasma proteins. The effect of concentrated solutions of human and bovine serum albumin on blood volume after acute blood loss in man. J. Clin. Invest., 1943, 22: 763.
108. HICKS, R. G., and COLLINS, V. J. Experiences with intravenous gelatin. N. York State J. M., 1951, 51: 1819.
109. HIGGINS, A. R., HARPER, H. A., KIMMEL, J. R., BURNS, T. W., JONES, R. E., JR., SMITH, T. W. D., and KLEIN, C. L. A study of oxypolygelatin in human subjects. J. Appl. Physiol. In press.
110. HISSINK, L. A. G. The value of the protein hydrolysate capain (amparon) in the treatment of traumatic shock. Med. J. Australia, 1950, 1: 187.
111. Idem. Een nieuw middel ter behandeling van shocklijders: "Capaine." Ned. tschr. geneesk., 1944, 1: 521.
112. HOFFMAN, W. S., and KOZOLL, D. D. The fate of intravenously injected gelatin in human subjects. J. Clin. Invest., 1946, 25: 575.
113. HOITINK, A. W. J. H. Experimental experiences with the intravenous injection of gum and salt solutions. Arch. Physiol., 1940, 25: 173.
114. HOLT, J. P., and KNOEFEL, P. K. Changes in plasma volume and cardiac output following the intravenous injection of gelatin, serum, and physiological saline solution. J. Clin. Invest., 1944, 23: 657.
115. HOPPS, H. C. The use of gelatin as a blood substitute. Illinois M. J., 1944, 86: 215.
116. HUEPER, W. C. Experimental studies in cardiovascular pathology. V. Effects of intravenous injections of solutions of gum arabic, egg albumin, and gelatin upon the blood and organs of dogs and rabbits. Am. J. Path., 1942, 18: 895.
117. Idem. Reactions in blood and organs of dogs on intravenous injection of solution of hemoglobin. J. Laborat. Clin. M., 1944, 29: 628.

*This report is in mimeographed form.

118. Idem. Experimental studies in cardiovascular pathology. VI. Pectin atheromatosis and thesaurosis in rabbits and dogs. Arch Path., Chic., 1942, 34: 883.

119. HUEPER, W. C., LANDSBERG, J. W., and ESKRIDGE, L. C. The effects of intravenous and intraperitoneal introduction of polyvinyl alcohol solutions upon the blood. J. Pharm. Exp. Ther., 1940, 70: 201.

120. HUEPER, W. C., MARTIN, G. J., and THOMPSON, M. R. Methyl cellulose solution as a plasma substitute. Am. J. Surg., 1942, 56: 629.

121. *HUMPHREY-LONG, J. Plasma Substitutes Program Progress Report. National Research Council, Washington, D. C., May 1, 1951.

122. INGELMAN, B. Investigations on dextran and its application as a plasma substitute. Upsala läk. fören. forh., 1949, 34: 107.

123. IVY, A. C., GREENGARD, H., STEIN, I. F., JR., GRODINS, F. S., and RUTTON, D. F. The effect of various blood substitutes in resuscitation after an otherwise fatal hemorrhage. Surg. Gyn. Obst., 1943, 76: 85.

124. JACOBSON, S. D., and SMYTH, C. J. Plasma volume changes following the intravenous injection of pectin and physiologic saline solution in man. Proc. Soc. Exp. Biol., N. Y., 1942, 50: 218.

125. Idem. Gelatin as a substitute for plasma. Observations on its administration to human beings. Arch. Int. M., 1944, 74: 254.

126. Idem. A comparative study of the effects of human plasma, physiologic saline solution, pectin, and gelatin (4% and 5%) on the plasma volume in man. Proc. Centr. Soc. Clin. Res., 1944, 17: 45.

127. JANEWAY, C. A., and ONCLEY, J. L. Blood substitutes. Advances in military medicine (O. S. R. D.), Boston, p. 441, 1948.

128. JOSEPH, G. H. Parenteral use of pectin sols. Fluid replacement therapy in emergency treatment of shock. Review published by Research Dept., California Fruit Growers Exchange, Ontario, California, 950.

129. JUSTER, R., PIRANI, C. L., CONSOLAZIO, C. F., and INGRAHAM, R. C. Dextran in hemorrhagic shock, Am. J. Physiol., 1951, 167: 800.

130. *KABAT, E. A. Twelfth Meeting, Subcommittee on Shock of the Committee on Surgery, National Research Council, Washington, D. C., p. 346, February 13, 1952.

131. KABAT, E. A., and BERG, D. Production of precipitins and cutaneous sensitivity in man by injection of small amounts of dextran. Preprinted Manuscript, New York Academy of Sciences, Conference on Shock Syndrome, November 1951, Ann. N. York Acad. Sc. In press.

132. KAHN, R. L., and MCNEIL, A. Compliment fixation with protein substances. J. Immun., Balt., 1918, 3: 277.

133. KEITH, N. M., POWER, M. H., and WAKEFIELD, E. G. The persistence of acacia in the blood after intravenous injection of acacia solution. Proc. Mayo Clin., 1935, 10: 38.

134. KEYES, A., TAYLOR, H. L., and SAVAGE, G. M. Utility of animal blood in preparation of plasma for transfusion. J. Am. M. Ass., 1941, 117: 62.

135. KIKUTH, W., BOCK, M., and GONNERT, R. The effect of kollidon on viruses. Zschr. Naturforsch., 1948, 3: 342.

136. KLEINBERG, W., REMINGTON, J. W., EVERSOLE, W. J., OVERMAN, R. R., and SWINGLE, W. W. The effectiveness of plasma, gelatin, and saline transfusions in preventing shock induced by leg muscle trauma and tourniquets. Am. J. Physiol., 1943, 140: 197.

137. KNOEFEL, P. K., and LEHMAN, G. Behavior in the body of some fractions of gelatin. J. Pharm. Exp. Ther., 1945, 83: 185.

138. KNUTSON, R. C., and BOLLMAN, J. L. Comparative effectiveness of certain volemic substances in maintaining plasma volume after blood loss. Clinical Congress of Am. Coll. Surgeons, 1951.

139. KNUTTI, R. E., GOETSCH, J. B., and WARRICK, R. A. Reciprocal changes in plasma protein and plasma acacia as a result of high and low protein diets. J. Exp. M., 1950, 91: 425.

140. KNUTTI, R. E., WARRICK, R. A., and GOETSCH, J. B. The maintenance of blood colloid: passage of stored gum acacia from the cells to the circulation after plasmapheresis. J. Exp. M., 1950, 92: 77.

141. KOEPSELL, H. J., TSUCHIYA, H. M., HELLMAN, N. N., KAZENKO, A., SHARPE, E. S., HOFFMAN, C. A., and JACKSON, R. W. Enzymatic synthesis of dextran. Bact. Proc., 1952, p. 23.

142. KOOP, C. E. The use of specially prepared gelatin solution as a plasma substitute. Surg. Clin. N. America, 1944, 24: 1300.

143. Idem. Plasma substitutes. Am. J. M. Sc., 1947, 213: 233.

144. KOOP, C. E., FLETCHER, A. G., JR., RIEGEL, C., and LOCKWOOD, J. S. Gelatin as a plasma substitute. A preliminary report of clinical experience. Surgery, 1944, 15: 839.

145. KOOP, C. E., RADCLIFFE, H. L., and MICHIE, A. J. Intravenous administration of gelatin and histologic changes in the kidney. Arch. Surg., 1949, 59: 185.

146. KORTH, J. Experimentelle untersuchungen ueber den einflusse verschiedener blutkonservierungs— und blutersatzmittel auf die atmung und die sauerstofftransportfunktion der menschlichen erythrocyten. Deut. Zschr. Chir., 1944, 259: 242.

147. KORTH, J., and HEINLEIN, H. Functional and morphological investigations of the action of colloidal blood substitutes, with special attention to the action of periston. Arch. klin. Chir., 1943, 205: 230.

148. KOZOLL, D. D., and HOFFMAN, W. S. The excretion of intravenously injected gelatin. Proc. Centr. Soc. Clin. Res., 1944, 17: 47.

149. KOZOLL, D. D., POPPER, H., STEIGMANN, F., and VOLK, B. W. Use of gelatin solutions in the treatment of human shock. Am. J. M. Sc., 1944, 208: 141.

150. KOZOLL, D. D., VOLK, B. W., STEIGMANN, F., and POPPER, H. Pectin excretion studies in human beings. J. Laborat. Clin. M., 1946, 31: 30.

151. *LANG, K. T. Twelfth Meeting, Subcommittee on Shock of the Committee on Surgery, National Research Council, Washington, D. C., p. 398, February 13, 1952.

152. LANGERON, L., PAGET, M., NOLF, V., and DURIEZ, L. The effect of intravenous injection of polyvinylpyrrolidone in 25 per cent solution on the renal function. Ann. biol. clin., Par., 1949, 7: 221.

153. LATHROP, K. A., and ALLEN, J. G. Progress Report: Metabolism of dextran. Quarterly Report of the Biological and Medical Research Division of the Argonne National Laboratory. In press.

*This report is in mimeographed form.

154. LAWSON, H., and REHM, W. S. The relative value of various fluids in the replacement of blood lost by hemorrhage, with special reference to the value of gelatin solutions. Am. J. Physiol., 1943, 140: 431.
155. LEVENSON, S. O., JANOTA, M., ARIMOTO, F., and NECHELES, H. Gelatin solution in the treatment of shock from graded hemorrhage. Surg. Gyn. Obst., 1947, 84: 925.
156. LEVRAT, M., PELLERAT, J., MOINDROT, R., and MURAT, M. Therapeutic use of insulin-subtosan in diabetes. Bull. Soc. méd. hôp. Paris, 1945, 61: 196.
157. LEWIS, J. H. Deantigenated beef blood plasma as a possible substitute for human blood plasma. Science, 1943, 98: 371.
158. LIPPMAN, R. W., MARTI, H. U., and OLIVER, J. Effect of oxypolygelatin on the hemoglobin excretion in the rat. Fed. Proc., Balt., 1952, 2: 96.
159. LITTLE, J. M., and DAMERON, J. T. Plasma retention, urinary excretion and the effect upon the circulating total red cell volume of intravenous gelatin in normal dogs. Am. J. Physiol., 1943, 139: 438.
160. Idem. Plasma retention, urinary excretion and the effect upon the circulating total red cell volume of intravenous gelatin in dogs with diminished plasma volume. Am. J. Physiol., 1943, 140: 636.
161. LITTLE, J. M., and WELLS, H. S. The capillary permeability to intravenously administered gelatin. Am. J. Physiol., 1942, 138: 495.
162. LOCKE, W. An experimental method for evaluating blood substitutes. Science, 1944, 99: 475.
163. LOEWEN, C. H. Die schwere verbrennung. Med. Klin., Berl., 1949, 23: 736.
164. LOUBATIERES, A. Intravenous injection of PVP produced severe and prolonged shock in dogs. C. rend. Soc. biol., 1948, 142: 1340.
165. Idem. PVP, a retarding agent for insulin and protamine zinc insulin: experimental demonstration in the depancreatized dog. Ann. endocr., Par., 1946, 7: 173.
166. LOWELL, A., COLCHER, H., KENDALL, F. E., PATEK, A. J., JR., and SEEGAL, D. A comparison of the effects of high and low viscosity gelatins after their intravenous injection in man. J. Clin. Invest., 1946, 25: 226.
167. MAES, U., and DAVIS, H. A. Fluid replacement in surgical states. With particular reference to transfusion of ascitic fluid. A clinical and experimental study. Arch. Surg., 1941, 42: 453.
168. MANNIX, E. P., JR. Arabinosis: An exogenous macromolecular storage disease. With report of a case following the intravenous use of acacia in the treatment of nephrotic syndrome. Brooklyn Hosp. J., 1947, 5: 200.
169. MARSHALL, M. E., and DEUTSCH, H. F. Clearance of some proteins by the dog kidney. Am. J. Physiol., 1950, 163: 461.
170. MASSONS, J. M. Calf plasma or serum for transfusion. Lancet, Lond., 1946, 2: 341.
171. MAYCOCK, W. d'A. Analysis of reports on the infusion of dextran solution. Lancet, Lond., 1952, 1: 6718.
172. MAYERSON, H. S. Personal communication.
173. *Idem. Progress report on dextran experiments. Report to National Research Council, Washington, D. C., August 31, 1951.

*This report is in mimeographed form.

174. MAYTUM, C. K., and MAGATH, T. B. Sensitivity to acacia. J. Am. M. Ass., 1932, 99: 2251.
175. MCCARTHY, M. D., and PARKINS, W. M. Comparative effectiveness of albumin, globin, hemoglobin, gelatin, oxypolygelatin, saline solution, Ringer's solution, blood, and plasma upon the survival of rats subjected to standardized scald burns. Am. J. Physiol., 1947, 150: 428.
176. MCCLURE, R. D., WARREN, K. W., and FALLIS, L. S. Intravenous pectin solution in the prophylaxis and treatment of shock. Canad. M. Ass. J., 1944, 51: 206.
177. MELKA, J., RAPANT, V., and ZAPLETAL, B. Denatured calf plasma for transfusion. Lancet, Lond., 1947, 2: 382.
178. MEYER, K. A., KOZOLL, D. D., POPPER, H., and STEIGMANN, F. W. Pectin solutions used in the treatment of shock. Surg. Gyn. Obst., 1944, 78: 327.
179. MEYER, L. M., BERLIN, N. I., HYDE, G. M., PARSONS, R. J., and WHITTINGTON, B. Changes in the blood volume following the administration of dextran. Surg. Gyn. Obst., 1952, 94: 712.
180. *MICHIE, A. J. The effects of dextran on kidney function. Report to National Research Council, Washington, D. C., September 17, 1951.
181. *MICHIE, A. J., and RAGNI, M. C. Preliminary report on the effect of dextran on renal function. Report, Hospital of the University of Pennsylvania, National Research Council, Washington, D. C., July 16, 1951.
182. MIDDLETON, S., and WIGGERS, C. J. Some effects of pectin solutions during posthemorrhagic hypotension. Am. J. Physiol., 1943, 140: 326.
183. MILLER, R. E., and LITTLE, J. M. Studies on the in vivo conglutination of erythrocytes following the intravenous administration of gelatin solutions. J. Cellul. Physiol., 1943, 22: 127.
184. MILNER, R. D. Personal communication.
185. MOREHEAD, R. P., and LITTLE, J. M. A morphological study following the intravenous administration of gelatin solutions to dogs. Am. J. Path., 1945, 21: 333.
186. MORI, S. Experimentelle beitraege zur wiederherstellung des bluteiweisses sowie dessen kolloidosmotischen drucks. I. Beeinflussung der wiederherstellung des bluteiweisses sowie dessen kolloid-osmotischen drucks nach plasmaphaeresis durch die beschaffenheitsveraenderung der mit erythrocyten reinfusierten fluessigkeiten. Tohoku J. Exp. M., 1947, 49: 111.
187. MORRISON, A. E., JR., LUNDY, J. S., and ESSEX, H. E. An evaluation of replacement fluids in laboratory animals following controlled hemorrhage. Circulation, 1952, 2: 208.
188. MOWRY, R. W., LONGLEY, J. B., and MILLICAN, R. C. Histochemical demonstration of intravenously injected dextran in the kidney and liver of the mouse. J. Laborat. Clin. M., 1952, 39: 211.
189. MURAT, M. Étude de certaines proprietes, chemiques pharmacodynamiques, et pharmacologiques de la polyvinylpyrrolidone. Thesis, University of Lyon, p. 87, July 10, 1945.
190. *MYERS, J. D. Dextran on splanchnic circulation and metabolism. Report to National Research Council, Washington, D. C., January 25, 1951.
191. NARAT, J. K., CASELLA, P. A., and CANGELOSI, J. P. Shock therapy with intraperitoneal infusion of blood volume replenishers, dextran and polyvinylpyrrolidone. Arch. Surg., 1952, 64: 80.

192. NEILL, J. M., and ABRAHAMS, I. Reaction of dextrans with antiserums of rabbits immunized with Salmonella Typhosa. Proc. Soc. Exp. Biol., N. Y., 1951, 78: 537.
193. NELSON, A. A., and LUSKY, L. M. Pathological changes in rabbits from repeated intravenous injections of periston (polyvinylpyrrolidone) or dextran. Proc. Soc. Exp. Biol., N. Y., 1951, 76: 765.
194. NICHOLL, R. J., BOUCHER, W. F., and PRINCE, R. W. Hemorrhagic shock. The relative effect of amino acids, amigen, and gelatin in dogs. Surg. Gyn. Obst., 1945, 80: 181.
195. NICOLL, G. A. Blood transfusion substitutes. Present status. N. Orleans M. & S. J., 1944, 97: 211.
196. PAGANI, C. The problem of synthetic blood substitutes and retarding vehicles. Absorption and elimination of polyvinylpyrrolidone in pregnancy and the puerperium. Ann. ostet. gin., 1950, 72: 165.
197. PAPPENHEIMER, J. R., RENKIN, E. M., and BORRERO, L. M. Filtration, diffusion, and molecular sieving through perpheral capillary membranes. Am. J. Physiol., 1951, 167: 13.
198. PARKINS, W. M., KOOP, C. E., RIEGEL, C., VARS, H. M., and LOCKWOOD, J. S. Gelatin as a plasma substitute, with particular reference to experimental hemorrhage and burn shock. Ann. Surg., 1943, 118: 193.
199. PARKINS, W. M., and LOCKWOOD, J. S. Studies on gelatin as a plasma substitute. I. Efficacy of gelatin in experimental hemorrhage and burn shock. Am. J. M. Sc., 1943, 205: 876.
200. *PARKINS, W. M., PERLMUTT, J. H., and VARS, H. M. Effectiveness of polyglucose as a plasma expander. Report to National Research Council, Washington, D. C., September 17, 1951.
201. *Idem. Comparative effectiveness of plasma expanders on dogs subjected to experimental hemorrhage. II. Hemorrhagic hypotension shock. Report, Hospital of the University of Pennsylvania, National Research Council, Washington, D. C., July 16, 1951.
202. Idem. Dextran, modified fluid gelatin and other plasma volume expanders in hemorrhaged dogs. Fed. Proc., Balt., 1952, 2: 116.
203. PELLERAT, J., MARAL, R., and MURAT, M. Histological study of the viscera of guinea pigs after injection of massive doses of polyvinylpyrrolidone (subtosan). Rev. Therapeut., 1948, V. 4.
204. Idem. Retardand subtosan (subtosanretard) and its applications. J. méd. Lyon., 1947, 611.
205. PENFIELD, W. G. Treatment of severe and progressive hemorrhage by intravenous injection. Am. J. Physiol., 1919, 48: 121.
206. *PENNELL, R. B. Globin. Preparation and properties of modified human globin. Symposium on Burns, National Research Council, Washington, D. C., p. 64, 1950.
207. POPPER, H., VOLK, D. W., MEYER, K. A., KOZOLL, D. D., and STEIGMANN, F. W. Evaluation of pectin and gelatin solutions used in the treatment of shock: histologic changes produced in the human being. J. Laborat. Clin. M., 1943, 30: 352.
208. *PORTER, C. C., and SILBER, R. H. Plasma volume extenders. Polyglucose from DuPont. Report to National Research Council, Washington, D. C., March 12, 1951.
209. PUGSLEY, H. E., and FARQUHARSON, R. F. The clinical use of isinglass. Canad. M. Ass. J., 1943, 49: 262.
210. PULASKI, E. J., REISS, E., TARROW, A., BAKER, H. J., ARTZ, C. P., and DAVIS, J. H. Personal communication.
211. RAISZ, L. G., and PULASKI, E. J. A comparison of the efficacy of dextran, oxypolygelatin, plasma, and saline as plasma volume expanders. Am. J. Physiol., 1952, 169: 475.
212. RAISZ, L. G., and STINSON, I. T. Unpublished observations.
213. RAVDIN, I. S. Abstract of discussion. Arch. Surg., 1951, 63: 745.
214. *Idem. Gelatin. Symposium on Burns. National Research Council, 1950, 2: 80.
215. RAVDIN, I. S., and FITTS, W. T., JR. The so-called "blood substitutes." Am. J. Surg., 1950, 80: 744.
216. *RICHARDS, D. W. Twelfth Meeting, Subcommittee on Shock of the Committee on Surgery, National Research Council, Washington, D. C., p. 357, February 13, 1952.
217. RICHTER, G. W. Parenchymatous lesions of the liver and kidney of mice due to pectin. Am. J. Path., 1950, 26: 379.
218. RICKETTS, C. R., LORENZ, L., and MAYCOCK, W. d'A. Molecular composition of dextran solutions for intravenous use. Nature, Lond., 1950, 165: 770.
219. RIEDEL, G., and ZIPF, K. Tierexperimentelle untersuchungen ueber blutersatzmittel. Arch. exp. Path., Lpz., 1944, 203: 25.
220. ROBSCHEIT-ROBBINS, F. S., MILLER, L. L., and WHIPPLE, G. H. Gelatin—its usefulness and toxicity. Blood protein production impaired by continued injection of gelatin by vein. J. Exp. M., 1944, 80: 145.
221. ROOME, N. W., RUTTLE, L., WILLIAMS, L., and SMITH, W. The consideration of polyvinyl alcohols as blood substitutes. Canad. M. Ass. J., 1944, 51: 293.
222. ROSENQVIST, H., and THORSEN, G. Macrodex in the treatment of extensive burns. Arch. Surg., 1951, 62: 525.
223. ROUSSET, J. Use of retarding vehicle in the penicillin therapy of gonorrhea. Ann. derm. syph., Par., 1946, 6: 709.
224. SCHOEN, H. Organveraenderungen beim saeugling nach zufuhr von periston. Klin. Wschr., 1940, 27: 463.
225. SCHUBERT, R. Ueber die ausscheidung an periston gebundener stoffe (bilirubin, indigo-carmine) and einiges ueber die ausscheidung von periston selbst. Klin. Wschr., 1948, 26: 143.
226. Idem. A new means of detoxicating the body by replacing the bile-liver system by the kidneys as organs of excretion of substances bound to artificial colloids. Rev. Gastroenter., N. Y., 1950, 17: 165.
227. Idem. Sanierung des serums von nierenuntahigen stoffen durch kolloid verschiedener teilchengrasse. (Reifenversuche und meerschweinchen mit trypanrot). Deut. Zschr. Verdauungskr., 1950, 10: 79.
228. Idem. Tissue washing with synthetic colloids. Angew. Chem., 1949, 61: 492.
229. Idem. Einfluss von kollidon auf tetanustoxin. Arztl. Forsch., 1949, 3: 425.
230. SCHUBERT, R., and WERNER, H. Serum und gewegssanierung durch kolloidon; versuche am kaninchen mit diaminreinblau FF. Zbl. inn. Med., 1950, 5: 298.

*This report is in mimeographed form.

231. SCOTT, C. C., WORTH, H. M., and ROBBINS, E. B. Comparative value of some blood substitutes used for treatment of experimental shock. Arch. Surg., 1944, 48: 315.
232. SELDON, T. H., LUNDY, J. S., ADAMS, R. C., and COOK, E. N. Parenteral administration of gelatin. Proc. Mayo Clin., 1945, 20: 468.
233. *SHANNON, J. A. Twelfth Meeting, Subcommittee on Shock of the Committee on Surgery, National Research Council, Washington, D. C., p. 355, February 13, 1952.
234. SHEARBURN, E. W. Effect of saline infusions upon the blood volume and serum protein of hypoproteinemic dogs. Proc. Soc. Exp. Biol., N. Y., 1942, 50: 140.
235. SIITERI, P. K. Unpublished observations.
236. SKINSNES, O. K. "Hydropic" swelling of renal tubules following intravenous administration of gelatin. Proc. Inst. M., Chicago, 1946, 16: 254.
237. SMALL, C. S., BRYANT, E. F., and PALMER, G. H. Studies of rabbit organs after intravenous injections of pectin sols. Arch. Surg., 1950, 60: 575.
238. SMALLEY, R. E., and BINGER, M. W. Chronic glomerulonephritis and the nephrotic syndrome. A follow-up investigation of patients treated with acacia. J. Am. M. Ass., 1944, 126: 532.
239. SMALLEY, R. E., BINGER, M. W., BOLLMAN, J. L., and POWER, M. H. Effect of intravenously administered solution of acacia on animals. Arch. Int. M., 1945, 76: 39.
240. SQUIRE, J. R. Recent experimental work with dextran. Proc. R. Soc. M., Lond., 1951, 44: 577.
241. STARIN, W. A. Antigenic properties of gelatin. J. Infect. Dis., 23: 139.
242. STARLING, E. H. On the absorption of fluids from the connective tissue spaces. J. Physiol., Lond., 1896, 19: 312.
243. STATE, D., ROMERO, F. T., CASTELLANOS, M. M., and WANGENSTEEN, O. H. Clinical evaluation of bovine serum albumin as a blood substitute. Surgery, 1947, 22: 424.
244. STEELE, R., VAN SLYKE, D. D., and PLAZIA, J. The fate of intravenously administered polyvinylpyrollidone. Conference on Shock Syndrome, New York Academy of Sciences, 1951.
245. STEIGMANN, F., MEYER, K. A., KOZOLL, D. D., VOLK, V. W., and POPPER, H. Gelatin solution as a plasma substitute. Am. J. Clin. Path., 1945, 15: 223.
246. STRUMIA, M. M. The use of modified human globin. Conference on Shock Syndrome, New York Academy of Sciences, 1951.
247. STRUMIA, M. M., BLAKE, A. D., JR., and CORNMAN, H. D. The diuretic effect of globin in chronic glomerulonephritis. J. Am. M. Ass., 1946, 131: 1033.
248. STRUMIA, M. M., BLAKE, A. D., REIDER, H. C., and CHORNOCK, F. W. The use of a "modified globin" from human erythrocytes in hypoproteinemias. Am. J. M. Sc., 1946, 211: 51.
249. STRUMIA, M. M., CHORNOCK, F. W., BLAKE, A. D., and KARR, W. G. The use of a "modified globin" from human erythrocytes as a plasma substitute. Am. J. M. Sc., 1945, 209: 436.
250. SUGG, J. Y., and HEHRE, E. J. Reactions of dextran of Leuconostoc mesenteroides with the antiserum of leuconostoc and of types 2, 20 and 12 pneumococcus. J. Immun., Balt., 1942, 43: 119.
251. SUGG, J. Y., HEHRE, E. J., and NEILL, J. H. Serologically similar polysaccharide produced from sucrose by certain streptococci and by Leuconostic mesenteroides. J. Bactiol., 1942, 43: 24.
252. SZEPSENWOL, J. Dextran in cultures of embryonic skeletal muscle. Anat. Rec., 1951, Abstr. 109.
253. TAYLOR, N. B., and MOORHOUSE, M. S. The use of isinglass as a blood substitute in hemorrhage and shock. Canad. M. Ass. J., 1943, 49: 251.
254. TAYLOR, N. B., and WATERS, E. T. Isinglass as a transfusion fluid in hemorrhage. Canad. M. Ass. J., 1941, 44: 547.
255. *TAYLOR, W. J., and MYERS, J. D. Effects of dextran on splanchnic circulation and metabolism. Report to National Research Council, Washington, D. C., May 1, 1951.
256. *Idem. Effects of dextran and other plasma expanders on splanchnic circulation and metabolism. Report to National Research Council, Washington, D. C., September 15, 1951.
257. TERRY, R., and YUILE, C. L. Fate of intravenous C^{14}-labeled dextran in dogs. Fed. Proc., Balt., 1952, 2: 430.
258. THORSEN, G. On dextran. Lecture to Swedish Medical Society, May, 1949.
259. Idem. Influence of dextran *p*H on tensile strength of healing wounds; an experimental study. Acta chir. scand., 1950, 100: 422.
260. Idem. Resuscitative effect of dextran *p*H after large hemorrhages. An experimental study. Acta chir. scand., 1950, 100: 221.
261. Idem. Dextran as a plasma substitute. Lancet, Lond., 1949, 256: 132.
262. THROWER, W. R., and CAMPBELL, H. PLASMOSAN. A synthetic substitute for plasma. Lancet, Lond., 1951, 1: 1096.
263. TSUCHIYA, H. M., KOEPSELL, H. J., CORMAN, J., BRYANT, G., and JACKSON, R. U. Production of dextran from dextran sucrase (coenzyme from Leuconostoc mesenteroides). Bact. Proc., 1952, p. 22.
264. TURNER, F. P., BUTLER, B. C., SMITH, M. G., and SCUDDER, J. Dextran—an experimental plasma substitute. Surg. Gyn. Obst., 1949, 88: 661.
265. VAN DEN HEUVEL, G. Dextran as a plasma substitute and blood-pressure hemostasis. J. Physiol., Lond., 1950, 3: 15.
266. VAN DER BROOK, M. J., LYSTER, S. C., GRAHAM, V. E., POMEROY, N. E., and CARTLAND, G. F. Intravenously administered gelatin as a toxicity study. J. Laborat. Clin. M., 1947, 32: 1115.
267. *VAN SLYKE, D. D. Periston. Plasma Substitutes Evaluation Program Report. National Research Council, Washington, D. C., March 19, 1951.
268. VARS, H. M. Tests of clinical evaluation and results of clinical studies. Report of Working Conference on Dextran, Peoria, Illinois, p. 60, July 9, 1951.
269. VOELKER, R., and BARKE, A. Periston as a blood substitute in the dog. Deut. tieraerztl. Wschr., 1943, 51: 261.
270. WAGENSTEEN, O. H., HALL, H., KREMEN, A., and STEVENS, B. Intravenous administration of bovine and human plasma to man: proof of its utilization. Proc. Soc. Exp. Biol., N. Y., 1940, 43: 616.
271. *WARNER, R. C. The excretion of PVP in relation to molecular weight. Report of Subcommittee on Shock to the Committee on Surgery, National Research Council, Washington, D. C., p. 378, February 13, 1952.

*This report is in mimeographed form.

272. WARREN, J., FEDES, J. C., and KENT, J. F. Serological reactions of human sera and rabbit sera with clinical dextran. Bact. Proc., 1952, p. 93.
273. WASSERMAN, K., and MAYERSON, H. S. Plasma and dextran infusion following hemorrhage in dogs. Fed. Proc., Balt., 1952, 11: 168.
274. WATERS, E. T. A comparison of isinglass and gelatin as blood substitutes. Canad. M. Ass. J., 1941, 45: 395.
275. *WATKIN, D. M., PHILLIPS, G. B., GABUZDA, G. J., and DAVIDSON, C. S. Clinical studies with dextran. Report to National Research Council, Washington, D. C., May 10, 1951.
276. *WELT, L., and CANNAN, R. K. Examination of samples of PVP recovered from urines of human subjects. Plasma Substitutes Program, National Research Council, June 1951.
277. *WELT, L., and LILLIAN, M. The effect of nonprotein colloidal solutions on the metabolism and excretion of electrolytes and water in normal and edematous subjects. Plasma Substitutes Program Progress Report, National Research Council, Washington, D. C., June 22, 1951.
278. *WILSON, J. S., DOYLE, J. T., ESTES, E. H., JR., and WARREN, J. V. The use of dextran in the treatment of shock. Report to National Research Council, Washington, D. C., December 26, 1950.
279. WILSON, J. S., ESTES, E. H., DOYLE, J. T., and BLOOM, W. L. Use of dextran in the treatment of shock. J. Clin. Invest., 1951, 30: 682.
280. WITHAM, A. C., FLEMING, J. W., and BLOOM, W. L. The effect of the intravenous administration of dextran on cardiac output and other circulatory dynamics. J. Clin. Invest., 1951, 30: 897.
281. YUILE, C. L., GOLD, N. A., and HINDS, E. G. Hemoglobin precipitation in the renal tubules; a study of its causes and effects. J. Exp. M., 1945, 82: 361.
282. YUILE, C. L., and KNUTTI, R. E. Blood plasma proteins as influenced by intravenous injection of gum acacia. II. Production of chronic hypoproteinemia. J. Exp. M., 1939, 70: 605.
283. *ZOLLINGER, R. Summary of periston study. Plasma Substitutes Program, National Research Council, Washington, D. C., July 10, 1951.
284. *ZOLLINGER, R., and ELLISON, E. H. An evaluation of the synthetic plasma expander polyvinyl pyrrolidone. Report to National Research Council, Washington, D. C., September 17, 1951.
285. ZOZAYA, J. Immunological reactions between dextran polysaccharide and some antibacterial sera. J. Exp. M., 1932, 55: 353.

*This report is in mimeographed form.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

The Operative Removal of Tumors of the Parotid Salivary Gland. HAYES MARTIN. *Surgery*, 1952, 31: 670.

There are two cardinal principles in the surgical removal of parotid tumors: first, the tumor must be completely removed, and second, unnecessary injury (either temporary or permanent) to the seventh cranial nerve or its larger branches must be avoided whenever possible.

The risk of injury to the facial nerve acts as a deterrent to an adequate exposure in many operations for parotid tumors, with the result that many growths are not completely removed. The frequency with which such incomplete operations are performed can be illustrated by the fact that 36 per cent of the patients admitted to Memorial Hospital for the treatment of parotid tumors have undergone previous surgical attempts to remove the growth. The best method of avoiding such injury, the author believes, is the routine exposure and identification of the nerve before proceeding with the actual removal of the tumor. The nerve can be most safely and readily exposed proximally as it emerges from the stylomastoid foramen.

The skin incision to be used and the operative technique for removal of the gland, with preservation of the facial nerve, are described. The article is well illustrated with clear semi-diagramatic drawings.

ELY ELLIOTT LAZARUS, M.D.

Management of Head and Neck Cancer by the General Surgeon. H. MASON MORFIT. *Arch. Surg.*, 1952, 64: 631.

The specialist who treats cancer of the head and neck should be skilled in the methods of diagnosing lesions in this location, as well as in the technique of therapy which is indicated (radiation or surgery). This includes the ability to use the laryngeal mirror, laryngoscope, esophagoscope, and bronchoscope, and the ability to interpret endoscopic findings. Preferably, the diagnostic and therapeutic procedures should be carried out by the same specialist.

Cancers of the head and neck (exclusive of the brain) occur in males ten times as frequently as in females, with the exception of cancer of the thyroid and salivary glands. Even though these tumors very commonly have lymphatic metastases, they remain confined to the primary site and area of original spread in the majority of cases.

Recently a method of treating intraoral cancer by means of excision of the primary lesion, portions of the mandible, and radical neck dissection in continuity has been employed for an increasing number of cases. It is indicated in certain patients with cancer of the gums, lateral margin of the tongue, adjacent floor of the mouth, cancers of the tonsillar pillar, and portions of the tongue adjacent to the tonsillar pillar. It may be used for cancer of the tonsil even though there is spread to the soft palate.

Important points in the author's technique include completion of a radical neck dissection prior to the intraoral part of the operation. The lower lip is split in the midline. The mandible is divided with a Gigli saw and deflected laterally. Good exposure in this manner enables the primary tumor to be excised accurately under direct vision. Closure is made by approximating the mucous membrane, and care is taken to obliterate dead space with stumps of pterygoid and masseter muscles. Two large Penrose drains are left beneath the skin flaps and both are brought out through the end of the wound near the clavicle. Postoperative care includes special attention to the tracheostomy tube for the first 24 hours. The tube is not removed until the patient can tolerate it for 24 hours with the opening corked off. Nasal feedings are continued until approximately 8 days postoperatively.

The postoperative cosmetic result is good in cases in which the symphysis menti is preserved. Sacrifice of the anterior curve of the mandible results in an "Andy Gump" appearance.

FREDERICK W. PRESTON, M.D.

Application of Combined Hemimandibulectomy and Neck Dissection to Oral Carcinoma. WALTER W. CARROLL. *Arch. Surg.*, 1952, 64: 647.

The author recommends hemimandibulectomy with radical neck dissection in continuity as a method of increasing the salvage rate for certain patients with intraoral cancer. His conclusions are based on a study of 186 patients with intraoral cancer, 46 of whom had radical neck dissection and some of whom also had hemimandibulectomy (exact number not stated). One postoperative death occurred.

The operation is useful for cancers of the lower gingiva, buccal mucosa near the lower gingiva, the nearby floor of the mouth, and the anterolateral two-thirds of the tongue. Radical neck dissection is done on the side of the lesion regardless of whether or not there is clinical or pathologic evidence of cervical lymph node metastases. The author refers to this as routine neck dissection. If the lesion approaches the midline, a simultaneous contralateral submaxillary dissection in continuity is added because of the increased risk of cross metastases. "The

finding of involved nodes on the opposite side calls for a complete deep jugular dissection at a later date."

In about 50 per cent of normal persons the lymphatics of the tongue and floor of the mouth pass through the periosteum of the mandible as they drain into the submaxillary or subdigastric nodes. Therefore it seems logical that the mandible should be included when dissection is done for carcinomas that lie close to it.

The operative technique involves inclusion of the platysma with the skin flaps, and division of the lower lip in the midline to give access to the oral cavity. Tracheostomy is established at the time of surgery and maintained postoperatively until the patient is able to swallow. An indwelling nasogastric tube is used postoperatively for the first 10 days.

Patients submitted to this procedure have been rehabilitated quickly, and early recurrences have not been a source of difficulty. Whether or not the salvage rate of these patients will be better than has been previously obtained in other patients cannot be determined as it is too early to evaluate the long-term survivals. FREDERICK W. PRESTON, M.D.

EYE

The Physiopathology and the Technique of Iridencleisis. SAMUEL J. MEYER. *Am. J. Ophth.*, 1952, 35: 788.

Iridencleisis returned intraocular pressure to normal, regardless of the initial preoperative tension and the anatomic variation of the impaction of the iris, in 35 cases of chronic deep angle glaucoma, in 25 cases of acute shallow angle glaucoma, and in 25 cases of subacute glaucoma. Tension curves in 3 normal patients, in 3 patients with iridencleisis in one eye only, and in 3 patients with bilateral iridencleisis indicated that the tension in the two eyes varied similarly. In 30 patients in whom iridencleisis was done in both eyes, there was a striking parallelism in the postoperative tension despite the variations in the volume of iris incarcerated and the type of scar. These observations do not favor the theory that an iridencleisis is effective by creating a fistula. If this mechanical theory were true, there would be considerable difference in postoperative tension, depending upon the type of glaucoma, initial tension, type of operation, and the like. It is suggested that an iridencleisis reduces ocular tension by inducing complex neurovascular modifications at the level of the anterior uvea.

The scars following iridencleisis may be classified, according to their appearance, into (1) flat scars, (2) vesiculated scars, and (3) bullous or cystic scars. A hypotension may be present with cystic scars, suggesting the possibility that fistulization is superimposed upon the principal tension-lowering factor. Aqueous veins are difficult to observe following iridencleisis and this suggests that postoperative reduction of tension is not due to an increase in flow in the aqueous veins.

The following operative technique is suggested: An ab externo incision in the region of the anterior chamber angle which allows spontaneous prolapse of the iris. Iridotomy involving the root of the iris is desirable but not indispensable. The most important factor in the reduction of tension is incarceration of the iris in the scleral wound.

FRANK W. NEWELL, M.D.

Possible Malignant Melanoma of the Choroid J. ARNOLD DEVEER. *Arch. Ophth.*, Chic., 1952, 47: 734.

A case of possible malignant melanoma of the choroid in a woman 25 years of age is presented. A small, heavily pigmented tumor of the choroid was encountered by chance in an enucleated phthisical eye. The tumor was intimately associated with a long posterior ciliary nerve. For this reason the origin of the growth from cells of the sheath of Schwann was considered likely. Although invasive growth could not be shown and the cells were not of the highly anaplastic type, the possibility of malignancy could not be excluded. A diagnosis of "possible early malignant melanoma" was made.

It is possible that chronic inflammation, which had produced hyperplasia of many of the ocular tissues, may also have played a rôle in the development of the neoplastic lesion.

deVeer emphasizes the need for removing hopelessly blind eyes to prevent the possible development of malignant melanoma. Such eyes encountered in childhood should be enucleated prior to puberty because malignant melanoma of the uvea, like that of the skin, is almost unknown before adolescence.

JOSHUA ZUCKERMAN, M.D.

NOSE AND SINUSES

Intranasal Chondrosarcoma. LAWRENCE J. LAWSON. *Arch. Otolar.*, Chic., 1952, 55: 559.

Chondrosarcoma is an uncommon tumor which occurs in the nose or in the larynx, usually in adults from 25 to 50 years of age. In the majority of cases it arises from a previously existing chondroma. The transformation is gradual and the tumor may be detected easier by clinical and x-ray observation than by its histologic characteristics. Metastasis is late, usually to the lungs. Histologic characteristics suggesting malignancy are: (1) poorly formed intercellular matrix, (2) increased cellularity, (3) irregular nuclear patterns, and (4) obvious accelerated growth at the margins of the lobules. Chondroma and chondrosarcoma are radioresistant and have a known tendency to recur if not removed widely, including a margin of normal tissue.

The problem in the case of nasal or sinus cavities is that complete removal may require a disfiguring operation while incomplete removal is always followed by recurrence and extension.

When the tumor occurs early in life it is likely to be more active than it would be in later years. One case is presented of a slowly growing tumor in late

adult life, in which conservative procedures only were used over a period of 9 years, whereas an attempt at adequate removal would have produced unacceptable deformity.

The author reviews another case in a 16 year old boy, in whom extension, metastases and a fatal termination occurred within 40 months of recognition of the tumor.

The rhinologist must decide whether radical procedures planned to destroy the tumor completely are demanded, or whether conservative treatment with probable recurrences is justifiable.

JOHN R. LINDSAY, M.D.

Treatment of Oroantral Fistula. LINDEN J. WALLNER. *Arch. Otolar.*, Chic., 1952, 55: 666.

A thin sinus floor and an abscess at the root of a tooth may make an oroantral fistula unavoidable following extraction.

Fundamentals of treatment of an acute oroantral fistula are adequate antibiotic therapy, avoidance of any manipulation through the fistula, including irrigation, care in nose blowing so as to avoid forcing air through the fistula, and diagnostic intranasal irrigation of the sinus. If pus is present a reasonable number of irrigations may be tried, and, if unsuccessful, a window should be made into the inferior meatus. If seen early suture of the gingival margins may be successful.

In a chronic fistula, the primary requisite is cure of the sinus infection followed by some type of closure of the fistula.

A simple antrum window suffices in most cases, but the Caldwell-Luc operation facilitates removal of any foreign body or tooth roots.

The Berger operation was used successfully to close the fistula in 10 cases. In this operation, a horizontal incision is made along the alveolus through the fistula down to the bone and the periosteum is elevated along the margins of the fistula. At each end of the first incision a vertical incision upward through the alveolus is made, and thus a flap considerably larger than the defect is obtained. These incisions are extended to the buccoalveolar fold and the periosteum is elevated up to the fold and incised, thereby permitting the flap to be pulled over the fistula without tension. Mattress sutures are used at the end of the flap, and interrupted sutures to close vertical incisions. JOHN R. LINDSAY, M.D.

NECK

Recurrent Nodular Goiter in Children. R. H. HEPTINSTALL and SIR ARTHUR PORRITT. *Brit. J. Surg.*, 1952, 39: 433.

Three cases of recurrent adenomas of the thyroid gland occurring in 2 boys and 1 girl, aged 9, 13, and 13 years, respectively, are presented. In the 2 latter cases, thyroid swelling had been present for many years.

Treatment consisted in partial thyroidectomy, repeated when necessary even to the stage of total thyroidectomy. One of the patients was operated upon four times. X-rays appear to have little or no effect on this condition.

In no case could frank malignancy be diagnosed on the basis of the usually accepted pathological criteria. Attention, however, is called to the abnormality of the gland as a whole in the form of numerous seedling nodules scattered throughout the thyroid tissue.

The preoperative administration of thyroid extract is considered of value, and the prognosis in these cases is regarded as good.

ELY ELLIOTT LAZARUS, M.D.

Cervical Neurofibroma in the Differential Diagnosis of Carotid Body Tumor. T. H. CULLEN and R. S. MONRO. *Brit. J. Surg.*, 1952, 39: 454.

Two cases of neurinoma of the cervical sympathetic chain simulating carotid body tumor are reported.

The impossibility of differentiating clinically between cervical nerve-sheath tumor and carotid body tumor, and the importance of making this differentiation by biopsy are illustrated.

ELY ELLIOTT LAZARUS, M.D.

Cancer of the Hypopharynx and Its Surgical Treatment. RONALD W. RAVEN. *Brit. M. J.*, 1952, 2: 951.

Cancer of the hypopharynx causes severe suffering by grossly interfering with respiration or deglutition, and the number of patients cured is small. Early symptoms may be vague and may be described inaccurately. The first symptom may be the sensation of a foreign body in the pharynx with a constant desire to clear the throat. Later dysphagia, dyspnea, hoarseness, or cough may be experienced. Some complain of pain in the ear aggravated by swallowing. Growth on the posterior wall causes minimal symptoms, and often metastases are present at the time of the initial interview.

Radical surgery offers relief of distressing symptoms and the possibility of cure. Raven favors laryngopharyngectomy and laryngoesophagopharyngectomy with a bilateral block dissection of lymph nodes as either a one-stage or two-stage procedure. Of 18 patients with proved squamous-cell carcinoma of the hypopharynx, 14 had marked pharyngeal extension, or extension to the larynx, esophagus, or surrounding cervical tissues. In 9 cases metastases were found in cervical lymph nodes. There was no operative mortality; 6 patients died of cancer and 2 died of other causes within a year. Ten patients are alive up to 34 months postoperatively.

THOMAS LANE STOKES, M.D.

Combined Operations in the Management of Cancer of the Head and Neck. JOHN O. VIETA and JOSEPH E. MULÉ. *Am. J. Surg.*, 1952, 83: 734.

Increasing emphasis is being placed on surgery rather than roentgen therapy in the management of carcinoma of the head and neck. The results of

roentgen therapy have been disappointing in spite of the development of supervoltage therapy. In addition, roentgen therapy is not satisfactory for the treatment of cervical lymph node metastases because a cancerocidal dose can not be delivered to the wide cervical area typically involved in the metastases. Roentgen treatment may result in extensive necrosis, and the length of time required for treatment is often much longer than for surgery. When surgery is the method used, it is possible to check by frozen section the adequacy of the excision.

Radical surgical treatment should include excision of the primary lesion and the node-bearing areas, in one stage if possible. The principles observed in the eradication of carcinoma of the colon and of the breast should pertain, when possible, to the surgical management of carcinoma of the head and neck.

Surgery is the treatment of choice for carcinoma of the lip. Small lesions may be removed by a V excision. Larger lesions may require cheiloplasty. When there is infiltration of the muscles of the lip or when the carcinoma is undifferentiated, a bilateral supraomohyoid neck dissection should be performed. Should positive nodes be present, a complete radical neck dissection on the involved side plus a supraomohyoid on the opposite side should be the operation of choice.

Carcinoma of the floor of the mouth, when superficial and noninfiltrating, with no evidence of cervical node metastases, may be excised locally, including the contiguous alveolar ridge of the mandible and the inner table of this bone. This excision should be combined with a supraomohoid neck dissection on the side of the lesion. Should the lesion involve the mandible and cervical nodes, a hemiresection of the mandible, together with a complete radical neck dissection in continuity with the floor of the mouth, is the procedure of choice.

Carcinoma of the base of the tongue is best treated by irradiation. Those lesions which are situated in the anterior two-thirds of the tongue can be selected for surgical therapy. The authors believe that a radical neck dissection should be performed in all cases of carcinoma of the tongue, and this should preferably be bilateral.

Early carcinoma of the true vocal cords can be treated by irradiation or surgery; however, for extensive (either intrinsic or extrinsic) carcinoma of the larynx, better palliation and a better chance of cure is obtained by surgery. Neck dissection is not performed in the treatment of intrinsic lesions because of the low incidence of cervical metastases. However, if metastatic nodes are present a radical neck dissection, in continuity with a total laryngectomy, is the method of choice. Patients with extrinsic carcinoma of the larynx are treated by one-stage total laryngectomy and radical neck dissection regardless of the absence of clinically involved lymph nodes. There is a high incidence (70 per cent) of bilateral lymph node involvement in extrinsic carcinoma of the larynx and therefore a radical neck dissection on the opposite side should be performed at a later date.

Included in the article is a description of the treatment of carcinoma of the thyroid gland, of the salivary glands, and of the skin of the head and neck. Illustrative case reports are included.

ROBERT A. WISE, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Carotid-Cavernous Aneurysm. GIOVANNI RUGGIERO and FRANCESCO CASTELLANO. *Acta radiol.*, Stockh., 1952, 37: 121.

The authors review the anatomy and dynamics of carotid-cavernous aneurysm in detail. They present the clinical and arteriographic findings in 11 cases along with their mode of management and follow-up. Arteriography is the single most important contribution to intelligent therapy. It affords significant data on the collateral circulation, and the size and anatomical relations of the lesion. Both anteroposterior and lateral films of both hemispheres are necessary, and the anterior cerebral circulation is of critical interest in evaluating the efficiency of the collateral blood supply. The Matas test is discounted as of no practical value in gauging the efficiency of the collateral circulation since complications always arise several hours after ligation.

The authors discuss the various techniques of treatment reported in cases presenting these complications and contrast them with their own. They believe that the best results are obtained by primary ligation of the common carotid artery in the neck followed by ligation of the internal carotid artery in the neck, intracranially, or both in the neck and intracranially. If the ligation is tolerated it is due to the increased blood flow through the contralateral carotid artery and not by way of the ipsilateral external carotid artery. It is not necessary to take into account the position of origin of the ophthalmic artery in planning intracranial ligation of the carotid artery since experience has shown that ligation of the ophthalmic itself can be carried out with no damage to vision. The results with spontaneous carotid-cavernous aneurysm are not as good as with the traumatic type under any regimen because the patients with the former type are usually hypertensive and arteriosclerotic.

An excellent bibliography is appended.

EDWARD B. SCHLESINGER, M.D.

Extradural Hemorrhage. K. C. BRADLEY. *Austral. N. Zealand J. Surg.*, 1952, 21: 241.

Extradural hemorrhage is still the source of constant worry for surgeons dealing with head injuries, so that this comprehensive review is most acceptable. It sums up the ideas of most of the English language articles. The bibliography is quite complete.

After a short historical note the anatomy and pathological anatomy are discussed with suitable references to the author's 27 cases, of which 10 were under his personal care. It is possible that, when the source of bleeding is described, there is too little emphasis on the venous origin of the blood. Tentorial herniation is well described, especially the mechanism of oculomotor signs. The late development of contralateral third nerve irritation and paralysis is illustrated. The author does not believe that bilateral dilated fixed pupils indicate a hopeless situation, provided operation is undertaken within a half-hour. The behavior of such pupils immediately after evacuation of the clot gives an immediate indication of prognostic value. The anatomical illustrations are convincing.

The diagnosis, signs, and symptoms are dealt with in the conventional manner, with special emphasis on pupillary changes and the conscious state. It is pointed out that while x-ray examination is of value, in certain cases the time would be better spent in the operating room. Operative technique is touched upon. Finally, a few case histories are appended to illustrate various types of cases.

In spite of the constant consideration of this syndrome, the mortality rate continues to be high; in this series it was 56 per cent. Later intervention is the principal but not the only reason. Severe concomitant brain damage may be a deciding factor. The strong emphasis on anatomy and pathological anatomy makes the article instructive and sound.

ADRIEN VER BRUGGHEN, M.D.

Delayed Onset of Symptoms Due to Extradural Hematomas. ARTHUR B. KING and JOHN W. CHAMBERS. *Surgery*, 1952, 31: 839.

Extradural hemorrhage, secondary to head injury, is usually expected to manifest itself within 12 to 24 hours. In a number of cases the time interval may be longer. Cases have been reported in which there was a delay of 12, 31, and even 34 days between the injury and the onset of symptoms.

This report concerns 8 cases, in 1 infant, 2 children, and 5 young adults in whom the time interval between injury and the symptoms was 12 hours or more. In this group the longest interval was 11 days. The trauma was sufficiently severe to produce unconsciousness in 4 patients, whereas 6 had demonstrable fractures of the skull. The source of bleeding was venous in 4 and from the smaller branches of the meningeal arteries in 3. In only 1 patient was the main trunk of the middle meningeal artery involved; in this case the time interval before symptoms appeared was 4 days. The bleeding had evidently ceased spontaneously.

The discussion centers around the fact that delayed symptoms from extradural hemorrhage are not sufficiently emphasized. The source of bleeding may be difficult to ascertain even at operation. There was no correlation between arterial or venous bleeding and the length of the delay before symptoms appeared. It is noteworthy that in contrast to the usually high mortality rate from the more rapidly oncoming clots, all of these patients survived. The

emergency, however, still continues to be present when the symptoms eventually develop. Adequate and prolonged observation of patients developing new symptoms is necessary following a head injury.

The 8 case histories are appended with a suitable bibliography. ADRIEN VER BRUGGHEN, M.D.

Expanding Intracranial Lesions in Childhood. HAROLD D. PALMER and EDWARD S. MURPHY. *J. Am. M. Ass.*, 1952, 149: 220.

The authors studied 104 patients with brain tumors at the Denver Childrens' Hospital; 90 cases were proved histologically. These did not include abscesses or hematomas.

Gliomas comprised 50.33 per cent of the tumors in this group of cases. Of interest is that the breakdown of the glioma group differs from that of previously reported groups. The gliomas included 11 ependymomas, 4 ependymoblastomas, 11 medulloblastomas, 8 astrocytomas, 7 spongioblastomas polare, and 5 glioblastomas. Although the greatest majority of the gliomas were situated in the infratentorial region, the majority of the remaining types of tumors were in the supratentorial region.

The symptoms were usually multiple and were of comparatively little help in actual localization of the tumor, which, of course, is to be expected in the examination of children. The two most frequent symptoms were vomiting and headache. It should be pointed out that a description of "projectile" vomiting was infrequently elicited. In relation to age, the highest percentage of tumors occurred in the 6 year old group. Lesions were diagnosed in a rather large group of infants (11) under 1 year of age, and 10 other cases gave a history of the onset of the disturbance at 1 year of age.

Ventriculography should usually be performed as the final diagnostic test despite any assumed added risk. In the present group, this would have prevented several negative suboccipital craniectomies, in which cases a mistaken localization of a posterior fossa neoplasm had been assumed.

JACK I. WOOLF, M.D.

SPINAL CORD AND ITS COVERINGS

Spinal Cord Involvement by Schistosomiasis Mansoni. GORDON L. ROSS, JOHN W. NORCROSS, and GILBERT HORAX. *N. England J. M.*, 1952, 246: 823.

A case report of a 16-year-old Venezuelan boy suffering from schistosomiasis of the spinal cord constitutes the basis for this article. The patient's symptoms of spinal cord compression began 8 months prior to admission to the hospital. An earlier laminectomy at the lower thoracic and upper lumbar level had been negative. When the patient was seen at the New England Baptist Hospital in Boston, the signs clearly pointed to the upper thoracic level. A myelogram also incriminated this region and laminectomy revealed a diffuse swelling of the cord at the 4th to 6th thoracic level. A dorsal incision into the cord revealed a grayish friable intramedullary mass which proved to be a granuloma of Schistosoma mansoni origin. The patient's postoperative course was uneventful and he was treated by intramuscular administration of trivalent organic antimony compound (fuadin).

This case is of interest as it is apparently the first instance of this particular ectopic lesion to be reported in North America, although there have been similar cases in Brazil and Venezuela. The diagnosis is made by discovery of specific ova in the feces, by certain serological tests, and by the presence of the ova or adult parasite in the biopsy specimen. Ova of Schistosoma mansoni were also obtained from a granulomatous lesion in the rectum of the patient whose case has been reported.

This parasite enters the body through the skin and lives primarily in the portacaval circulation. The most plausible explanation for the ectopic lesions is based on the valveless intercommunications between the portal and caval veins and the vertebral venous plexus, which in turn communicates with other parts of the body. JOSEPH RANSOHOFF, M.D.

Intraspinal Lesions Simulating Protruded Intervertebral Discs. W. MCK. CRAIG, H. J. SVIEN, H. W. DODGE, JR., and J. D. CAMP. *J. Am. M. Ass.*, 1952, 149: 250.

From a study of 1,296 cases in which operation was performed at the Mayo Clinic for intraspinal lesions at or below the level of the tenth thoracic vertebra, it is evident that the symptoms and signs of spinal cord tumors which originate at the level of the tenth thoracic vertebra or lower may simulate those of the protruded lumbar intervertebral disc. In these instances the true nature of the lesion producing the signs and symptoms cannot be determined from the history of the case, or from the neurologic, orthopedic, or simple roentgenographic examination.

However, when intraspinal investigation, consisting of analysis of the spinal fluid, and contrast myelographic studies are carried out, the presence of intraspinal tumor becomes evident and its location is established in most instances. In those instances in which intraspinal investigation does not establish the true nature of the lesion, myelographic study with contrast medium localizes the lesion accurately. In this way the operation can be directed to the site of the lesion, and the proper diagnosis can be established at operation. By analysis of the spinal fluid and contrast myelographic studies, a significant number of errors can be avoided.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Spontaneous Fractures of Both First Ribs. S. Aubrey Jenkins. *J. Bone Surg.*, 1952, 34-B: 9.

This fracture has been variously reported as a developmental anomaly, a synchrondrosis, or a pseudarthrosis, but most authors now regard it as a true fracture. As far as can be ascertained, only 263 cases of isolated fracture of the first rib have been recorded in the literature and only 17 of these were bilateral.

When the fracture is first diagnosed, the roentgenograms may show either a simple linear crack in the rib or a pseudarthrosis with widened, irregular, sclerotic, opposing surfaces, or the fracture may already be soundly healed with varying degrees of residual thickening of the rib about the fracture. Some deny that this lesion is a fracture at all and attribute it to a developmental anomaly, because of the absence of a history of injury and the rarity of nonunion of fractures in other ribs.

In the few patients who present themselves with symptoms immediately after the fracture, the clinical findings are characteristic if the possibility of this fracture is kept in mind. The main feature is pain, which usually begins acutely and causes the patient to support the arm with his other hand as though he had sustained a fracture of the clavicle; but sometimes the pain develops only slowly. It persists as a vaguely localized pain at the base of the neck or in the upper chest, behind the clavicle or under the scapula. The pain is increased by abduction of the shoulder, and sudden unpremeditated movements of the arm in any direction may cause sudden stabs of pain. Occasionally, pain or paresthesias radiate down the arm but always along its medial aspect, in the region supplied by the lower trunk of the brachial plexus. There may be weakness of the whole arm at first and the strength of the grip is diminished. This is directly related to the pain and rapidly recovers as the pain subsides.

No specific treatment is required. The pain or discomfort invariably subsides and the patient is usually free from symptoms within a few days irrespective of the treatment given, and even though the fracture may not unite. A simple sling may be required and the patient should avoid heavy work or excessive movement of the arm until free from discomfort.

A case of spontaneous fracture of a first rib is described. Its evolution from a previously intact rib through the stage of a "linear" crack to pseudarthrosis has been traced. An older pseudarthrosis was present on the opposite side and Alderson's observation is confirmed—that the breach in the rib is acquired. It is concluded that there is no need to suppose a developmental anomaly of ossification, even in bilateral cases. Stephen A. Zieman, M.D.

Tuberculous Disease of the Breast. K. C. McKeown and K. W. Wilkinson. *Brit. J. Surg.*, 1952, 39: 420.

The incidence of tuberculous mastitis, though certainly not high, is frequent enough to merit attention. The importance of its study is emphasized by the difficulty that is experienced in differentiating between this disease and carcinoma of the breast.

In the majority of the cases the disease occurs between the ages of 20 and 50 years, almost exclusively in females, and more commonly in women who have borne children.

The breast may become infected in a variety of ways, such as by hematogenous spread, direct inoculation, ductal infection, spread from contiguous structures, or lymphatic spread. It is probable that lymphatic routes are the more usual ways by which the gland becomes infected. The lesion in the breast may be primary, with no other tuberculous lesion present, or, more commonly, secondary to another lesion elsewhere. The disease is usually unilateral, and the sides are affected with equal frequency.

In the secondary type of the disease, the long history of tuberculosis will lead the clinician to suspect the nature of the breast lesion. Primary tuberculous mastitis is a condition much more difficult to diagnose. The first symptom is a swelling which eventually adheres to the skin, progresses over a period of months, forms an abscess, which discharges or is incised, and forms a sinus which persists and discharges a thin watery pus.

Differential diagnosis must be made from carcinoma, acute mastitis, actinomycosis, or chronic mastitis.

Treatment is surgical—excision of a primary lesion or a modified radical mastectomy in the secondary type of disease. The author believes, however, that surgical treatment may become modified by the use of new antibiotics effective against the tubercle bacillus. Ely Elliott Lazarus, M.D.

TRACHEA, LUNGS, AND PLEURA

Plastic Reconstruction of the Trachea and Bronchi (Reconstruction plastique de la trachée et des bronches). H. Métras, H. Longefait, M. Grégoire, and L. Hartung. *Presse med.*, 1952, 60: 427.

Preservation of a lung or one of its lobes may depend on successful reconstruction of the trachea or the bronchi. Airtight approximation of the severed parts and cicatrization of the peribronchial tissues, followed by epithelial proliferation, are the essential factors of plastic reconstruction. Insufficient rigidity of the free graft or the pedicle may cause a collapse of the tracheal or bronchial lumen, with resulting asphyxia. Complications may be expected if the loss of tissues exceeds 4 cm. in length or if it involves the entire circumference of the trachea or the bronchus. In a large percentage of cases cica-

tricial bronchial stenosis may be corrected by Gebauer's skin graft.

Plastic reconstruction by means of a sliding flap may be employed after loss of a lateral portion of the trachea following removal of a bronchial cancer of the right upper lobe.

Skin or fascia may be utilized for grafts but the transplanted tissues must be reinforced by incorporating metal wires to give them sufficient rigidity.

Homografts are followed by a greater number of failures than autografts.

The employment of foreign material such as polyethylene, vitallium, or nylon cloth is still in the experimental stage.

The main indications for plastic operations are benign or malignant tumors, or cicatricial tuberculous stenosis.

The authors successfully employed Gebauer's skin transplantation in 2 patients with cicatricial stenosis, and a sliding bronchial flap was employed in 1 patient with invasion of the trachea by cancer.

JOSEPH K. NARAT, M.D.

Encysted Pleuropulmonary Hematomas (Les hématomes pleuro-pulmonaires enkystés). RENÉ SAUVAGE AND PIERRE DELAFONTAINE. *Sem. hôp. Paris*, 1952, 28: 513.

The case histories of a series of patients exhibiting encysted pleural and pulmonary hematomas are presented. In addition to the traumatic hematomas, certain spontaneous hematomas apparently occur within the thorax. The exact explanation for such spontaneous bleeding cannot always be determined. Some of the hematomas remain liquid and become encysted, while the remainder become either partially or completely organized, involving the lung as well as the pleura in the process.

The most important consideration is the differentiation of these hematomas from actual endothoracic tumors. In addition to the difficulty of differentiating them from true neoplasms, the fact that they cause compression of the pulmonary tissue and occasionally become infected suggests that exploratory thoracotomy should be practiced more frequently in the management of these conditions.

ORVILLE F. GRIMES, M.D.

Primary Carcinoma of the Lung. S. AUBREY GITTENS and JOHN P. MIHALY. *Dis. Chest.*, 1952, 21: 641.

This report entails a statistical study of patients with carcinoma of the lung who were seen on the chronic chest service of a municipal hospital during a 5-year-period beginning with 1945.

The diagnosis of carcinoma of the lung was made in a total of 88 patients on the basis of clinical, roentgenological, or bronchoscopic evidence. In 28 patients only this diagnosis was confirmed histologically: in 14 by bronchoscopy, in 4 by exploratory thoracotomy, in 3 by lymph node biopsy, in 1 patient by aspiration biopsy, in 1 patient by the Papanicolaou smear, and in 5 patients by autopsy examination.

In this series 86 per cent of the patients were males and 14 per cent were females; their ages ranged from 33 to 75 years. The duration of symptoms averaged 18.2 weeks, while the duration of life after hospital admission averaged 46.5 days. In 38.5 per cent the tumor was of the epidermoid type, in 35 per cent of the anaplastic type, in 7 per cent it was an adenocarcinoma, and in 17.5 per cent the type was not specified. The tumor was located in the right lung in 71.4 per cent and in the left lung in 28.6 per cent.

None of the patients in this series was seen sufficiently early to be benefited by surgical therapy. No racial predilection of carcinoma of the lung for white or negro people was determinable.

B. G. P. SHAFIROFF, M.D.

Newer Palliative Measures in the Management of Inoperable Bronchogenic Carcinoma. EDGAR MAYER and BERNARD ROSWIT. *Dis. Chest*, 1952, 21: 491.

Because there is an over-all survival of about 5 per cent in patients with bronchogenic carcinoma, palliative therapy is very important.

The most effective palliation is achieved with x-rays. Several techniques are utilized; they include: (1) palliation with 3,000 roentgens, (2) intensive therapy with 5,000 to 6,000 roentgens, (3) the use of radioactive cobalt or gold, and (4) the use of multimillion-volt x-rays. These methods are potentiated with various focusing and directing techniques through numerous portals of entry.

When radiation therapy is not feasible, nitrogen mustard given intravenously or orally may give impressive relief. As with radiotherapy, the more undifferentiated lesions respond the best. Occasionally, nitrogen mustard may be used in the pleural space or in preparation for the later use of radiotherapy.

Surgical procedures of benefit in advanced cases include palliative resection, fulguration of intrabronchial tumor tissue, posterior rhizotomy, cervical cordotomy, and prefrontal lobotomy. With these procedures, pain, cavitation and abscess formation, and pressure symptoms may be relieved.

Palliative medical therapy includes the control of bronchial infection with drainage and antibiotics, the maintenance of nutrition with amino acids and emulsified fats, the intravenous administration of procaine or alcohol for pain, the use of cortisone for its nonspecific effects, the use of testosterone as an aid in achieving a positive nitrogen balance, and, finally, the rotation of the newer narcotics to minimize addiction while relieving pain.

ROBERT L. CRAIG, M.D.

The Open Closure of the Bronchus and the Resection of the Carina and of the Tracheal Wall. VIKING OLOV BJÖRK, ERIC CARLENS, and CLARENCE CRAFOORD. *J. Thorac. Surg.*, 1952, 23: 419.

The double lumen catheter constructed by Carlens for bronchospirometry and for one lung anesthesia has facilitated certain technical steps in lung resec-

tions to such a degree that it is now in daily use in the clinic of these authors.

The catheter is made of rubber in two sizes. The lumen of each side corresponds to a circular area with a diameter of 7 mm. in the catheter for men and one of 6 mm. in that for women. The total outer diameters are 13 and 11 mm., respectively.

The tube is introduced under topical anesthesia without the aid of fluoroscopy or bronchoscopy. Under mirror guidance it is introduced over a curved metal stylet. The rubber hook is tied down to the catheter with a moistened silk thread until the tube with a slight rotating movement has been passed through the larynx, when the slipknot is untied. The catheter is gently pushed downward and turns automatically to the left when the curved stylet is withdrawn. During the introduction it exerts a slight pressure on the left tracheal wall and therefore enters the left main bronchus. It is then easy to feel when the hook is engaged by the carina. A slight pressure downward is then exerted on the catheter when the cuffs are inflated. Then anesthesia and suction can be applied to each lung separately. The hook and the two rubber cuffs will maintain the catheter in correct position. It is not necessary nor advisable to have a higher pressure in the cuffs than enough to get an airtight closure of the bronchus and the trachea. This is easily controlled when the artificial respiration is started.

It is also possible, either in general or in local anesthesia, to introduce the catheter over a straight metal stylet through a laryngoscope and remove the stylet and the silk thread as soon as the hook has passed the larynx. Many anesthetists prefer this technique, but in patients with a short neck and big teeth it may be of value to be familiar with the former procedure as well.

The experience with more than 300 resections has shown the main advantages of the flexible double lumen catheter for one lung anesthesia to be:

1. The open closure of the bronchus which facilitates the resection of the carina and of the tracheal wall.

2. Prevention of transbronchial spread in wet cases and elimination of the need of the "face-down" position in tuberculosis. Continuous suction can be applied to the bronchus draining the diseased area.

3. The possibility of lung deflation to provide more operating space when the lung is separated from the chest wall, and when the lobar and intersegmental planes are developed the lung can be reinflated.

The technique of the simple bronchial closure is as follows:

1. Dissection and removal of the peripheral bronchial cartilaginous ring. Cartilage has a poor blood supply and does not take part in healing.

2. Sutures of braided stainless No. 0000 (Deknatel) silk are made with an atraumatic needle.

3. A continuous suture of terminal No. 0000 (Deknatel) silk is made with a curved atraumatic needle.

4. A pedicled pleural flap is sewn over the bronchus.

Lobectomies and segmental resections may be performed on the right side in the same manner as on the left side, but in cases of pneumonectomy on the left side the described open closure of the bronchus cannot be carried out. When the lung is liberated and the hilar structures are dissected, the cuffs are deflated and the catheter is withdrawn about 5 cm. Immediately beforehand the bronchial secretion on the left side is aspirated to prevent spread. Afterward the proximal cuff only is reinflated, both lumina are connected with the anesthesia machine, and the catheter is used as a single lumen intratracheal tube. In the same moment as the catheter is withdrawn, a soft aortic clamp is placed at the origin of the bronchus.

One lung anesthesia makes it possible to cut through the bronchus whenever this is suitable during the resection and to leave it open until it is convenient to close it. It is not necessary to apply a clamp on the proximal part of the bronchus. Resection of the carina and an adjacent part of the trachea and left main bronchus is greatly facilitated.

The article is adequately illustrated.

JOHN E. KIRKPATRICK, M.D.

Pathophysiology of Respiration After Lobectomy and Pulmonectomy (Pathophysiologie der Atmung nach Lob und Pneumektomie). J. MAURATH and M. WERBER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1951, 269: 496.

Analyses of blood gases and spirographic determinations were made after 18 lobectomies and 31 pulmonectomies.

Changes in the lungs which required pulmonectomy were accompanied by a more marked undersaturation with oxygen than lesions which could be treated by lobectomy. The oxygen saturation following both types of operations was normal.

Respiratory reserves were equally limited by both operations. The diminution of the vital capacity of the lungs averaged 1,100 c.c.

The ventilation at rest remained unchanged following lobectomy. Spirograms and analyses of blood gases before the operation furnish information as to the function of the lungs, while such studies during the postoperative period allow evaluation of the results and estimation of the degree of disability.

JOSEPH K. NARAT, M.D.

HEART AND PERICARDIUM

Functional Problems in Cardiac and Pulmonary Diseases and Remarks on Surgical Intervention (Funktionsprobleme in der Herz-Lungenklinik nebst einigen Bemerkungen zur Herz-und Lungenchirurgie). H. W. KNIPPING. *Deut. med. Wschr.* 1952, 77: 487.

The author presents a brief summary of several articles by himself and his collaborators which were published previously.

He stresses the importance of exact diagnosis before pulmonary and cardiac surgery, and the desirability of arriving at a diagnosis before the cardiac reserves are exhausted in mitral stenosis. The patients should be submitted to surgery at a time when their myocardium decompensates only during work and not when the condition has progressed to decompensation at rest. Furthermore, the tests employed should permit differentiation between harmless, noisy disturbances and those that are harmful. For the cardiac surgeon the reserve of the left ventricle is the more important factor, while pulmonary resection requires knowledge of the reserve of the right ventricle. These data can be gained only with cardiac catheterization, spirography, electrocardiograms, and labor tests.

Six hundred patients were examined with these methods and the results were published by Bolt *et al.* It was shown that with the help of intracardiac catheterization and strophanthin injection, as well as residual air determinations, one can readily gain information regarding cardiac insufficiency at rest. An indirect way has to be employed to secure information regarding decompensation during work since arterial pressures cannot be measured at high Watt-levels and the electrocardiogram is distorted. Specific data should be read in previous publications (Bolt *et al.*, Liese, Knipping, Doge).

The analyses of many patients have led to the conclusion that many an elderly patient may be treated with physical therapy and take active part in sports, an essential part of the author's therapeutic program. KURT BENIRSCHKE, M.D.

Successful Removal of Tumor of the Heart. ELMER R. MAURER. *J. Thorac. Surg.*, 1952, 23: 479.

Tumors of the heart, both primary and metastatic, are comparatively rare, and the successful surgical removal of such tumors is exceedingly rare.

The author reports the case of a 44-year-old man who was diagnosed as having a pericardial celomic cyst. At operation a longitudinal incision was made in the pericardial sac anterior to the phrenic nerve, and the sac was opened widely. Almost immediately, numerous large loops and coils of adipose tissue bulged into the right chest. The entire tumor was completely delivered, down to a common stalk which was attached to the anterior surface of the left ventricle, over a circular area which measured approximately 4 by 4 cm. in diameter. The tumor was apparently a lipoma which arose from the superficial layer of the myocardium beneath the epicardium. Otherwise, the heart was grossly normal.

The tumor was removed in its entirety and bleeding was arrested without difficulty.

Following the operation the patient had a very uneventful course. He was ambulatory by his second postoperative day, and was discharged from the hospital, with the wound healed, on the ninth postoperative day.

As nearly as can be determined, this is the first report of a successful removal of a primary lipoma of the heart and the second instance of a successful removal of a tumor of the heart, including all varieties. The tumor in the case presented was the largest primary tumor, weighing 3½ pounds, malignant or benign, which had been reported in the literature to date. Primary lipoma of the heart is a pathologic rarity, only 2 proved cases having been reported previously. STEPHEN A. ZIEMAN, M.D.

Surgical Considerations of Intrathoracic Aneurysms of the Aorta and Great Vessels. DENTON A. COOLEY and MICHAEL E. DEBAKEY. *Ann. Surg.*, 1952, 135: 660.

The various methods of surgical treatment of aneurysms of the intrathoracic aorta and great vessels are briefly reviewed and evaluated. These methods are classified into three major groups: (1) those designed to induce thrombosis and fibrotic organization of the process by ligation, the introduction of foreign material, or periarterial fibroblastic reaction, (2) endoaneurysmorrhaphy, and (3) extirpation of the lesion with or without restoration of the blood flow through the parent vessel.

Aneurysm of the thoracic aorta is a fatal disorder comparable in this respect to cancer; it emphasizes the need for an aggressive attitude with emphasis on removal of the diseased tissue and reconstruction of the vessel when possible. Provided the patient's condition permits operation without unreasonable risk, the gravity of the disease fully justifies exploratory thoracotomy, not only to establish the diagnosis but also to determine the applicability of appropriate surgical treatment.

Six cases are reported to illustrate the selection of the most effective surgical method, depending upon the nature, type, and location of the aneurysm.

The exposure advocated consists of an anterior thoracotomy through the second or third intercostal space to determine the nature and extent of the process and the feasibility of surgical excision, with subsequent extension of this incision cephalad to the suprasternal notch and median sternotomy if added exposure is necessary, or by division of the sternum transversely at the same level and extension in whichever direction the situation demands. Resection of the clavicle has not been found necessary.

The more conservative procedures directed toward the production of periarterial fibrosis, intrasaccular thrombosis, or both, are indicated under certain conditions, such as fusiform aneurysm of the aorta and sacciform aneurysms associated with extensive arterial sclerosis and atheromatous changes.

Proximal ligation alone should rarely, if ever, be used.

The procedure of choice is extirpation of the aneurysm, preferably with restoration of the normal blood flow. The frequent performance of exploratory thoracotomy in these cases will permit the application of this procedure more often than has been generally realized. It is indicated in sacciform aneurysms in which the neck is relatively small and the wall of the parent vessel is suitable for suture,

which lesions are most frequently encountered in syphilis.

Extirpation of the aneurysm along with its parent vessel is the procedure of choice when the aneurysms involve the major vessels of the thoracic aorta. Even when the aneurysm involves the origin of the vessel at the aorta, this procedure may be performed, provided the aortic wall will hold sutures.

The technique of lateral arterial suture for repair of large aortic defects is described and illustrated; it consists essentially in the placement of interrupted mattress sutures of fine silk, proximal or distal to the occluding clamp, and interrupted figure-of-eight sutures over the ends of the vessel.

BENJAMIN GOLDMAN, M.D.

ESOPHAGUS AND MEDIASTINUM

Spontaneous Laceration of the Esophagus (La lacerazione spontanea dell'esofago). CARLO MAURO. *Gior. ital. chir.*, 1952, 8: 151.

Having studied a case of spontaneous laceration of the esophagus at the Massachusetts General Hospital, Boston, the author presents an extensive survey of the literature on the etiology, symptomatology, pathology, and therapy of this condition.

A 63-year-old male, in apparent health, awoke with a sensation of nausea followed by continued bouts of severe emesis accompanied by diarrhea. At 1 p.m. during an act of vomiting the patient was seized by a severe acute epigastric pain and emesis ceased; he was then admitted to the hospital acutely ill, cyanotic, dyspneic, and with severe epigastric pain radiating to the left shoulder. The abdomen was diffusely tender and rigid, and there was decreased expansion, localized dullness, and an absence of breath sounds in the left chest. A roentgenogram of the chest showed air in the left mediastinum and a fluid level in the left pleural cavity and the posterior mediastinum. Following the diagnosis of esophageal perforation, the patient was explored 4 hours after onset of the condition. The pleural cavity contained clear, colorless fluid, and revealed a tense mediastinum from which were aspirated 600 c.c. of clotted blood, air, and gastric contents. The mobilized esophagus revealed a 3-cm. longitudinal laceration along the left lateroposterior surface, immediately above the diaphragm. The defect was closed in three layers with interrupted (Deknatel) sutures. Multiple catheter drains (with aspiration) and penicillin and streptomycin were inserted in the mediastinum. The postoperative course was uneventful and the patient was discharged from the hospital on the ninth postoperative day.

Such cases should be considered traumatic in origin, resulting from a sudden increase of pressure within the esophagus. Other cases are reported following meningitis and craniotomies about the basal ganglia. Ninety-two per cent of 103 reported cases in the literature were directly associated with emesis and the ingestion of alcoholic beverages. The etiological basis for this sudden increase of tension in the lower segment of the esophagus may be an inco-ordination of the muscular contraction during vomiting. This may result from the fatigue of continued vomiting, spasmodic contraction of the constrictor cardias, toxic action of alcohol on the vomiting center and, more rarely, previous lesions such as strictures and obstruction in and about the lower third of the esophagus. The inferior segment is most involved and the tension may be related to the defective muscular coat at this site, the weakness caused by the entrance of neurovascular bundles, or the angulation made about the tense fibromuscular esophageal hiatus of the diaphragm.

The laceration is usually small with clean edges, longitudinal, and located on the posterolateral surface. Following perforation, the posterior, and then the anterior mediastinum become filled with gastric juices, air, or both, and later (6 to 12 hours) there is evident a dissecting emphysema of the superior mediastinum extending to the neck.

Clinically, males (85%) are affected more than females; they are usually in the third to fifth decades, and have a history of alcoholism (72%). The presenting symptoms are characteristic and pain is seldom relieved by morphine. Vomiting usually ceases with the onset of perforation, but if it continues it is bloody. There is insatiable thirst and the patient is able to swallow sips of water, but this act is immediately followed by accentuated chest pain. There is a rapid downhill course with dyspnea, cyanosis, and impending vascular collapse.

The prognosis until 1944 was hopeless with a mortality rate of 100 per cent. Since 2 successfully treated cases were reported by Graham in 1944, about 50 cases have been reported; 34 patients were operated upon, of whom 22 survived, an operative mortality of 35.2 per cent. The procedure of choice is closure of the laceration as soon after the injury as is possible. If the conditions do not warrant this procedure, adequate drainage of the pleural cavity and mediastinum should be performed, and closure of the defect should be undertaken at a later period if necessary.

Supportive therapy should be intensive, consisting of blood transfusions, parenteral administration of fluid antibiotics, and the administration of oxygen by means of a nasal catheter. Continuous gastric aspiration should also be performed, the operator being certain that the tube is not in the mediastinum. The procedure of choice is a transthoracic approach with an ample opening into the mediastinal pleura, lavage of the cavity with saline solution, closure of the defect in the esophagus, instillation of antibiotics, and adequate drainage of the mediastinum and pleura. The postoperative course is followed intensely with oxygen and antibiotic therapy.

The author also discussed the possibility in which closure of the laceration is not possible and he believes that, as a secondary procedure, resection of the involved area of the esophagus with end-to-end anastomosis may be justified.

ROLAND A. MANFREDI, M.D.

Carcinoma of the Esophagus. EDWARD F. PARKER, CHARLES B. HANNA, and RAYMOND W. POSTLETHWAIT. *Ann. Surg.*, 1952, 135: 697.

It is apparent that the outlook for the patient with carcinoma of the esophagus is still extremely grave. As with other internal carcinomas, the problem of obtaining better results by surgical methods is largely concerned with early diagnosis. There is no doubt that if thorough and repeated investigations were carried out on patients with any symptom which conceivably might be due to carcinoma of the esophagus, the diagnosis could be established much earlier than it is in many cases at present.

In analyzing cases to ascertain the reasons for late diagnosis of the disease when symptoms have been present for relatively long periods, it was learned that in general the patient was not at fault. Often in instances of late diagnosis of malignant disease, especially in the negro, the statement is made that the patient did not seek advice soon enough. Actually, most of the patients sought treatment early. Instead, it was learned that more often than not, doctors in general failed to interpret the symptom (usually a sense of obstruction or pain on swallowing) as even suggestive of the possible presence of an intrinsic abnormality of the esophagus. This was true especially when any abnormality which might be the cause of the difficulty was found on physical examination.

While proper interpretation of the patient's history would lead to earlier diagnosis in the majority of cases, it will be recalled that almost 20 per cent of the patients had symptoms of only 3 weeks' duration or less. Also it will be recalled that most of the patients in this group with symptoms of such short duration were already inoperable or nonresectable. It is obvious that, particularly in such cases, a high index of suspicion is not sufficient. There is needed sorely some method of detecting the presence of malignancy in the asymptomatic patient.

In addition to early diagnosis, there are other problems involved in a consideration of methods to improve the results of surgical treatment in cases of carcinoma of the esophagus. These concern the lack of resistance to infection, the restoration of normal blood volumes, improvement of the reparative powers of the tissues, and the correction of malnutrition. These problems must be related to the starvation to which the patient with carcinoma of the esophagus is particularly subject, but they must also be related to the general catabolic effect of some malignant tumors.

It is common knowledge that adequate feeding by gastrostomy of a patient with an obstructing carcinoma limited to the esophagus does not result necessarily in an improvement in nutrition, and also that adequate oral feeding of a patient with an advanced malignancy not even involving the alimentary tract does not suffice to prevent increasing malnutrition. Until there is some increase in our knowledge concerning these matters, it is believed that the results of surgical treatment will fall far short of the desired levels. In the meantime, further improvement should be sought also in other methods of therapy, such as irradiation.

BENJAMIN GOLDMAN, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Mesenteric Thrombosis Following Blunt Abdominal Trauma. WILLIAM S. MCCUNE, JOHN M. KESHISHIAN, and BRIAN B. BLADES. *Ann. Surg.*, 1952, 135: 606.

Mesenteric venous thrombosis is related to three factors: venous stasis, alterations in the composition of the blood, and injury to the intima of the mesenteric veins. One or more of these factors is probably present in all cases.

Attempts have been made to determine the differences, if any, between the components of mesenteric and of peripheral venous blood. The number of platelets in mesenteric venous blood has been found to rise actually and relatively to the number in the general circulation in acute inflammatory abdominal conditions. The actual and relative number of platelets is also higher at the end of abdominal operations for inflammatory conditions than at the beginning. In tests for other elements concerned with blood coagulation, no significant differences were noted between the mesenteric and peripheral blood.

Four cases of mesenteric venous thrombosis following blunt abdominal trauma are presented. They illustrate these characteristics of this type of venous thrombosis: (1) the thrombus continues to extend even after resection of an infarcted segment of bowel, and unless all of the mesenteric thrombus has been removed, an extension of the gangrenous process may result, (2) the rate of propagation of the thrombus is very variable; intestinal infarction may occur immediately or be delayed for as long as 5 weeks, and (3) separate thrombi in different parts of the venous mesenteric bed may extend at different rates, producing intestinal infarction at varying intervals after the injury.

CHARLES BARON, M.D.

GASTROINTESTINAL TRACT

Arterial Blood Supply of Human Stomach. JOHN REID BROWN and JOHN WILLIAM DERR. *Arch. Surg.*, 1952, 64: 616.

With the use of human stomachs obtained 3 to 6 hours postmortem, injections were made into one of the four major vessels after tying off the other three. The media used was red liquid latex or India ink diluted with bovine plasma. The major vessels are the left and right gastric arteries and the left and right gastroepiploics. In addition, the short gastric arteries were injected after tying off the four major vessels. In every specimen (20 in all) there was complete filling of the entire intramural vascular network.

The study demonstrates the rich intramural blood supply of the stomach and indicates that one intact major artery to the stomach is enough to maintain the blood supply to that organ. The margin of safety in gastric operations involving mobilization of the stomach with ligation of major extramural vessels is considerable.

The study also demonstrates the futility of attempting to control gastric hemorrhage by ligation of one, two, or even three major extramural arteries.

FREDERICK W. PRESTON, M.D.

Massive Hypertrophic Gastritis. HOWARD A. PATTERSON. *Ann. Surg.*, 1952, 135: 646.

Massive hypertrophic gastritis and gastric polyposis are frequently confused in diagnosis. Both conditions are thought to have a tendency toward malignant change.

A case of massive, hypertrophic gastritis is described in which the diagnosis was made by means of the characteristically distorted stomach (Fig. 1) and negative gastric washings for neoplastic cells. The

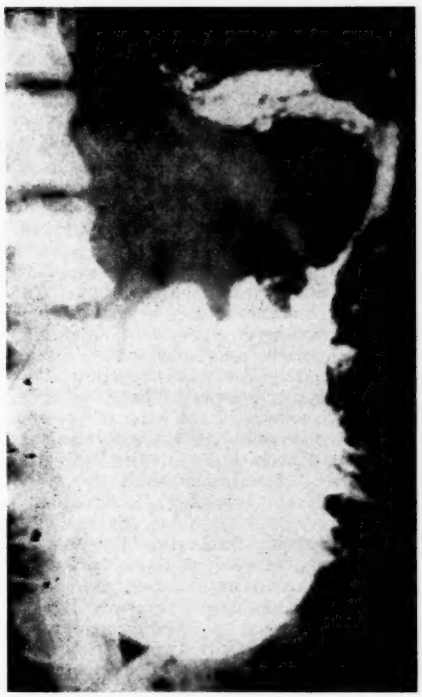

Fig. 1 (Patterson). Oblique roentgenogram of the stomach, showing great distortion of the proximal two-thirds of the stomach, with distensible normal antral portion. (Courtesy of J. B. Lippincott Co.)

Fig. 2 (Patterson). Showing the opened stomach with enormously thickened rugae. The junction with the normal (antral) portion of the stomach is seen at the left.

upper two-thirds of the stomach were resected and the esophagus was anastomosed to the distal third. Recovery was excellent and after 26 months the patient's condition is satisfactory.

Massive hypertrophic gastritis has a predilection for the proximal portion of the stomach and is characterized by tremendously hypertrophic mucous membrane, huge rugae, and cyst formation. Figure 2 illustrates the pathological appearance of the stomach. It is quite difficult to distinguish the condition from gastric polyposis. The predilection for the proximal portion of the stomach is striking. Clinically, the patients present a rather vague story of epigastric distress and anorexia. Weight loss is apt to be limited and is probably due largely to curtailed food intake. Bleeding may occur, but is not prominent.

Roentgenographic studies reveal the condition and the problem is then one of differential diagnosis. Roentgen ray, gastroscopic, and cytologic studies should all be used for this purpose. Exploration should not be delayed.

There seems no doubt that gastric polyps tend to become malignant, but hypertrophic gastritis has a lesser tendency toward malignant change. If the diagnosis of hypertrophic gastritis can be made, a portion of the stomach may be salvaged and the patient's condition will certainly become better.

ERNEST D. BLOOMENTHAL, M.D.

Segmental Gastric Resection for Peptic Ulcer. OWEN H. WANGENSTEEN. *J. Am. M. Ass.*, 1952, 149: 18.

Recently, the author has been performing a radical type of wedge resection of the stomach which he considers a physiologically sound operation for peptic ulcer in man. He terms the operation "an old procedure in modern dress." Early attempts at wedge resection failed to cure ulcer because no more than 28 to 55 per cent of the stomach was being resected. In Wangensteen's operation, the greater portion of the acid-secreting area is resected, leaving only a small residual gastric pouch beyond the esophagus, constituting less than 10 per cent and somewhat more than 5 per cent of the entire stomach area. The pylorus and entire antrum are preserved. Cases in which there is evidence of pyloric constriction due to the ulcer are subjected to a Heinecke-Mikulicz pyloroplasty in which a longitudinal pylorotomy incision is closed transversely. By this operation the area excised represents 80 per cent of the entire stomach and 90 per cent of the acid-secreting area. The technical details are presented.

The rationale of the operation is based on the proposition that there can be very little harm in leaving the gastrin-containing antrum (effectuator area) in which little if any hydrochloric acid is secreted. The sole contraindication to the procedure so far encountered has been the presence of antral ulcer.

In patients with defects at the upper portion of the lesser curvature, in whom segmental resection is contemplated, the author performed a Ramstedt extramucosal myotomy on the pylorus rather than a Heinecke-Mikulicz pyloroplasty. This change in technique under such circumstances is done to prevent regurgitation of bile into the esophagus.

Sixty patients have been operated upon by this method in the past 2 years. Although it is too early to speak of definitive results, the author is highly enthusiastic about the prospects of the operation. No recurrences have been observed during the brief period of follow-up. In dogs with ulcers produced by histamine-in-beeswax, the operation protects against the ulcer diathesis. The operation may be performed for duodenal as well as gastric ulcers located in the stomach proximal to the antrum. The procedure is particularly adaptable to large and difficult supraduodenal ulcer craters in which the performance of the Billroth I procedure is not possible, and in which the Billroth II operation would carry considerable hazard. The procedure appears to be an operation of choice in bleeding duodenal ulcers because of the ease of dealing with the site of hemorrhage.

HAROLD LAUFMAN, M.D.

Indications for Surgical Treatment of Gastric and Duodenal Ulcers and Their Complications (Les indications du traitement chirurgical des ulcères gastriques et duodénaux et de leurs complications). J. LIMBOSCH. *Bruxelles méd.*, 1952, 32: 973.

Medical treatment has little influence on the natural course of peptic ulcer. Cicatrization takes place

in the majority of ulcers of recent origin, a certain number of ulcers inexorably tend to chronicity, many recur, and some develop complications.

The author stresses the necessity of operating on chronic gastric ulcer even in the absence of complications. Operation is indicated if: (1) the crater does not close completely within 6 to 12 weeks, even if a patient over 45 years of age shows no clinical symptoms; (2) an ulcer recurs in a patient older than 45 years; (3) gastroscopic examination justifies the suspicion of malignant degeneration; (4) the ulcer has perforated into the liver or the pancreas; (5) a chronic ulcer does not yield to conservative treatment and interferes with the normal activity of the patient, even if he is younger than 45 years; (6) the ulcer is situated in the upper portion of the lesser curvature, on the major curvature, or in the pyloric region; (7) multiple ulcers are present, or a gastric ulcer is associated with a duodenal ulcer; (8) an ulcer recurs after its perforation has been treated by suturing; and (9) the patient has a chronic gastric ulcer and an old gastroenterostomy has been performed for duodenal ulcer.

High subtotal gastrectomy is the operation of choice. The author prefers antecolic anastomosis with a relatively long jejunal loop, a small stoma, and a valve formed according to Hofmeister's method. The mortality in his group of 78 cases was 2.6 per cent. The dumping syndrome is most frequently found when the afferent loop is short and the stoma is large, horizontal, and retrocolic. Poor results follow a too extensive or too small gastrectomy or when the proper indications for this procedure were lacking. Recurrences or anastomotic ulcer formations were not encountered by the author.

While he favors subtotal gastrectomy for a perforated gastric ulcer in the absence of contraindications, he prefers simple suturing of a perforated duodenal ulcer because in approximately 30 per cent of the cases such an operation is followed by the disappearance of all ulcer symptoms. Repeated hemorrhage which causes chronic anemia or severe bleeding in an elderly individual indicates an operation. Pyloric stenosis in young individuals is corrected by gastrectomy, and in old, fragile patients by gastroenterostomy. The author also recommends operation for large duodenal ulcers which have perforated, have been treated by suture and then have recurred, for concomitant duodenal and gastric ulcers, and for intractable chronic duodenal ulcers with large craters. JOSEPH K. NARAT, M.D.

Selection of Duodenal Ulcer Patients for Vagotomy. STEPHEN J. STEMPIEN, FRANKLIN B. WILKINS, and JOSEPH A. WEINBERG. *J. Am. M. Ass.*, 1952, 149: 416.

Successful vagotomy in the surgical treatment of duodenal and anastomotic peptic ulcers depends on the following factors: (1) a careful selection of patients, (2) the skill and experience of the surgeon in achieving a complete vagotomy, (3) the incorporation of a drainage procedure, preferably pyloroplasty, to avoid retention, and (4) the prolonged postoperative management of the patient until gastrointestinal function has been readjusted.

TABLE I.—PRIMARY INDICATIONS FOR VAGOTOMY IN TWO SERIES OF CASES

Primary Indication for Surgery	Percentage group of first 350 vagotomies	Percentage group of 100 most recent vagotomies
Inadequate medical response (intractable pain, intractable ulcer)	37	25
Hemorrhage	34	34
Pyloric obstruction	7	28
Multiple perforations	2	5
Diagnostic exploration	2	6
Occupational or economic necessity	2	2

In general, the patients who respond poorly to optimal medical management fall into two fairly well defined groups:

1. The organic group, comprising those who show considerable objective evidence of organic pathology, such as large craters, penetrating craters, inflammatory masses, and marked duodenal deformities, usually with at least a partial pyloric obstruction.

2. The psychosomatic group, comprising those who show minimal evidence of ulcer pathology but have a large overlay of psychic distress.

Surgery is indicated as an emergency procedure if the medical control of hemorrhage fails, and as an elective procedure in order to prevent hemorrhage from renewed ulceration.

Unremitting pyloroduodenal obstruction due to ulcer formation is so obviously a serious organic complication that surgical relief is imperative. The object of surgery is to remove or circumvent the obstruction by either a pyloroplasty or a gastroenterostomy. The addition of vagotomy has for its object the healing of the attendant ulcer and the prevention of its recurrence.

The pyloroplasty is preferred because: (1) surgical exposure of the ulcer-bearing area permits accurate diagnosis and localization, (2) there is a lessened tendency for the dumping syndrome, (3) the frequency of postoperative gastritis is diminished, and (4) the possibility of a later anastomotic ulcer is eliminated in case the vagotomy should be incomplete.

Multiple perforations are regarded as an indication for vagotomy especially in those patients in whom perforations occur without previous warning.

If diagnostic exploration reveals the lesion to be a benign duodenal ulcer, vagotomy and pyloroplasty are performed.

It is now generally agreed that vagotomy has its greatest usefulness in the surgical management of anastomotic ulcers, whether they are present after gastrectomy or after gastroenterostomy. In many instances the recurrence of symptoms after vagotomy and gastroenterostomy is not due to recurrence of

ulcer but rather to the development of postoperative gastritis. LEE PULLEN, M.D.

Results of Vagotomy During 7 Years. K. S. GRIMSON, C. R. ROWE, JR., and H. M. TAYLOR. *Ann. Surg.*, 1952, 135: 621.

Although 28 of the original 50 patients treated by vagotomy alone for duodenal ulcer, and 4 of the 5 thus treated for gastric ulcer have satisfactory clinical results, the necessity for secondary subtotal gastric resection in 3 discourages the use of vagotomy without a drainage procedure. Vagotomy as the sole surgical treatment for duodenal ulcer was abandoned in 1947.

Results of vagotomy and gastroenterostomy are encouraging. Of the three types of drainage procedure used, pyloroplasty was frequently followed by delayed emptying of the stomach, and exclusion was followed by rapid emptying of the stomach with occurrence of the "dumping syndrome." The short loop posterior gastroenterostomy gave the best results. There seems to be no important difference between the results among the private patients of one surgeon, and the results among ward patients treated by several surgeons.

Such differences as exist indicate that the private patients less frequently describe themselves as completely satisfied (76%), while the ward patients do so more frequently (88%). The percentages for ability to work full time were also lower in the private patients, 81 per cent as against 85 per cent. The percentage of patients equal to or heavier than their previous normal weight was essentially the same in the two groups, 53 per cent and 54 per cent. Also, the incidence of intermittent or persistent and usually mild diarrhea was essentially the same, 12 per cent and 11 per cent. However, more of the private patients had a good appetite, 64 per cent as against 46 per cent, and freedom from discomfort after eating, 73 per cent as against 62 per cent. For the purpose of evaluation, it seems justifiable to include the groups together.

Experiences following the use of vagotomy in 9 patients with gastric ulcer would indicate that vagotomy, preferably with gastroenterostomy, has been an effective treatment. The risk of overlooking cancer might therefore be accepted in circumstances in which subtotal gastric resection would be a hazardous procedure, or in circumstances such as juxtaesophageal gastric ulcer, which would require total gastrectomy. Ordinarily, subtotal gastric resection would be the operation preferred.

Experiences following the use of vagotomy in 28 patients with stomach ulcer would indicate that vagotomy, preferably without local resection of the ulcer, has been an effective treatment for most patients. A few have required or may yet require further treatment.

It is recognized that a number of patients among the 175 describe some difficulty with frequent bowel movements or intermittent diarrhea. Pancreatic secretions diminish after vagotomy as they may after subtotal gastric resection. After the demonstration of defective fat absorption in selected patients following vagotomy it was recommended that the few patients experiencing symptoms be placed on a low fat, high protein, high caloric diet. Of the 175 patients, however, only 7 describing themselves as moderately or poorly satisfied experienced diarrhea. Their diarrhea was seldom described as steatorrhea. More frequently it occurred in tense or anxious individuals of normal weight, or developed after dietary indiscretions.

A number of patients among the 175 described symptoms such as fullness after eating, bowel cramps, and excessive gas. These symptoms have not been a major cause of dissatisfaction. A major inconvenience, and occasionally a major concern, has been the temporary malfunction of the gastroenterostomy which occurred in 1 patient of 8 and necessitated gastric suction for several additional days in the hospital. Gastric retention usually became evident 7 or 8 days after operation. In 3 patients, the malfunction continued 3 to 4 weeks, requiring parenteral alimentation, and then subsided spontaneously in 2 of the patients and required a secondary operation to release adhesions in 1 of them.

If one calculates the late results of treatment for the entire group of patients (175) in terms of a clinical impression or personal opinion the percentage of satisfactory results would be 91.4 per cent.

Moderately satisfactory results would be listed for 4 patients because of mild or temporary recurrence of the ulcer and for 1 patient because of persistent diarrhea without malnutrition. Two additional patients were considered as having moderately satisfactory results because of delayed healing of a stoma ulcer and the ensuing development of partial obstruction by scar tissue. The last 2 patients considered as having moderately satisfactory results were 2 who died at 24 and 43 months because of pre-existing complicated gastrointestinal disorders. They were considered as having moderately satisfactory results rather than unsatisfactory results because they were relieved of their ulcer symptoms. Therefore, the percentage of moderately satisfactory results would be 5.14.

Definitely unsatisfactory results were obtained in 2 patients because of the occurrence of major hemorrhage following vagotomy, in 3 because of recurring intussusception (proved in 2 and diagnosed in 1 patient), and in 1 patient because of postoperative death. Therefore, the percentage of unquestionably unsatisfactory results would be 3.43.

The occurrence of continued excessive gastric secretion in a few patients has been of concern. When denervation has apparently been incomplete, or when symptoms of recurrence have developed, banthine has been used to supplement the vagotomy. The comparison of insulin tests in 26 patients studied for 3 to 7 years, and of control insulin tests in 12 patients with duodenal ulcer reveals that moderately high values for free acid (50 to 67 c.c. N/10 HCL) are obtained occasionally after vagotomy, but that

normal responses (75 to 132 c.c. N/10 HCL) were reached in only 1 patient (89 c.c. N/10 HCL.).

CHARLES BARON, M.D.

Acute Intestinal Obstruction in Infancy. CHARLES W. MCLAUGHLIN, JR., and JOHN D. COE. *Arch. Surg.*, 1952, 64: 541.

The present report deals with 53 consecutive infants having acute intestinal obstruction, and some observations on their management are presented. Included in this series are 5 different groups of conditions producing or resulting in acute intestinal obstruction; pyloric obstruction has been excluded from this discussion.

Twelve cases of duodenal obstruction were observed that necessitated 13 operative procedures. Treatment entailed severance of congenital bands and adhesions in 7 cases, gastrojejunostomy in 4 cases, and duodenojejunostomy in 1 case. The overall mortality was 2 deaths, or 16.7 per cent, occurring in infants 5 days and 21 days of age.

Eleven cases of small bowel obstruction were seen, in which 13 operative procedures were done. In 6 of the 11 cases the obstruction was congenital in origin, in 3 it was mechanical, and in 2 it was on an inflammatory basis. Specifically, the obstructions resulted from congenital adhesions, volvulus, meconium ileus, and atresia. Surgical decompression was undertaken in 4 cases, exploration with lysis of bands in 3, and a short-circuiting procedure in 4. This group of cases was the most discouraging in the series, with 4 recoveries and 7 deaths, a mortality of 64 per cent.

Nineteen cases of intussusception were observed in which the average age of the patients was 13 months on admission. In 17 cases the intussusception was ileocolic in type, in 1 instance it was ileal, and in another case it was entirely colic. Barium enemas were routinely used preoperatively for confirmation of the diagnosis and for partial reduction of the classic ileocolic type. In no instance, however, was the barium enema alone used as a therapeutic measure. Surgical management entailed reduction in 12 cases and resection in 7. There were 3 deaths in the entire group, giving a mortality of 15.7 per cent. Two of the deaths followed resection, one from shock and one from a postoperative pulmonary complication. The third death resulted from a gangrenous ileum on the fifth postoperative day, apparently due to vascular thrombosis after simple reduction. It is the feeling of the authors that if one cannot accomplish the reduction in 10 minutes' time, utilizing the various accepted methods, it is better to proceed immediately with resection.

Seven cases of incarcerated inguinal hernia requiring emergency reduction and repair were observed. Surgical reduction with a high sac ligation and limited repair was carried out in these 7 infants without mortality.

Four infants with imperforate anus were observed, their average age being 26 hours on admission. X-ray examination of the infants in the inverted position was carried out in each instance and was found helpful in estimating the length of the defect. Three of the 4 infants had definite abdominal distention at the time of operation, and in this condition a moderate degree of colonic distention is very helpful in bulging the lower rectal segment into the perineum. In 2 instances the perineal defect was less than 2.5 cm. and perineal continuity of the bowel was reestablished. In the other 2 cases, the rectal pouch ended blindly above the pelvic peritoneum, necessitating abdominal exploration and colostomy. There was 1 death, a mortality of 25 per cent. This infant had, in addition to imperforate anus, multiple congenital defects of its urogenital system.

ROBERT TURELL, M.D.

Acute Perforation in Regional Enteritis. J. G. GOW and ANTHONY WALSH. *Brit. J. Surg.*, 1952, 39: 445.

There are many ways in which regional enteritis may present itself. However, acute perforation of the gut into the general peritoneal cavity is almost unknown. The author presents 1 previously reported case and adds 2 cases of his own.

There were no symptoms prior to the acute onset, and diagnosis was made only at the time of laparotomy when a perforation was found in the inflamed loop of bowel. Simple suturing of the perforation is not satisfactory. The authors believe that the treatment of choice, after suture of the rent and reinforcement with an omental covering, is ileocolostomy with exclusion of the distal diseased segment of ileum.

ELY ELLIOTT LAZARUS, M.D.

Enteritis Necroticans. MARCEL PATTERSON and HAROLD D. ROSENBAUM. *Gastroenterology*, 1952, 21: 110.

The authors report the case of a 35-year-old woman suffering from a spruelike syndrome who suddenly went into profound circulatory collapse and died following an exsanguinating hemorrhage from the gastrointestinal tract. At autopsy, ulcerating lesions and crepitation of the jejunum were found, and large numbers of the Clostridium welchii, which were believed to be the causative agent, were isolated from the ulcers and blood.

In 1946 and 1947 reports appeared from Hamburg, Germany, of a number of cases of a severe illness, often fatal, due to necrotic inflammation of several areas of the intestine, especially the jejunum. It was given the name of "Darmbrand" or "enteritis necroticans" and was thought to be a specific pathologic entity.

The clinical picture in these cases was that of an acute onset with a short prodromal period. There was violent pain in the upper part of the abdomen, usually located a little to the left of the midline, with reflex rigidity of the abdominal wall. Nausea and vomiting were severe. The most striking clinical features were the circulatory collapse and general cyanosis. Death frequently occurred in 24 hours. Those who survived this stage were seen to pass into a stage characterized by enteritis with blood-stained

diarrhea or a condition resembling paralytic ileus. The temperature rarely rose above 100.4 degrees F. The sedimentation rate was elevated and the white blood count less strikingly increased. There was a shift to the left with toxemic changes in the leucocytes. Increased blood urea, low blood chlorides, indicanemia, and indicanuria were often demonstrated. In 1946 the mortality rate was 40 per cent and in 1947 it was 16 per cent. The shortest course noted was 10 hours; most patients who died were sick from 3 to 6 days.

Several observers noted the persistent appearance of a gram-positive rod in the ulcers, in material obtained by duodenal intubation and from the stools. This organism was found to be an obligate anaerobe of the Clostridium welchii group but unlike other known types of the group. The rods were larger, the colonies rough instead of glistening, and the heat resistance of the spores was greatly increased. The main toxin produced was beta toxin. It was labeled Clostridium welchii type F.

The authors believe that their case is the first reported occurrence of "enteritis necroticans" (a primary infection of the small intestine by Clostridium) in this country.

FREDERICK W. PRESTON, M.D.

The Present Status of Exfoliative Cytology in the Diagnosis of Gastrointestinal Malignancy. CYRUS E. RUBIN, WALTER L. PALMER, and JOSEPH B. KIRSNER. *Gastroenterology*, 1952, 21: 1.

Exfoliative cytology for the purpose of diagnosis of neoplastic disease has been most useful for neoplasms of the uterus, cervix, and lungs, but has been disappointing for neoplasms of the kidney, bladder, and prostate.

The study of exfoliated cells from the esophagus is of limited value because of the accessibility of most esophageal lesions to esophagoscopic biopsy. However, in patients in whom esophagoscopy is hazardous and in patients in whom strictures prohibit the passage of a scope the procedure is useful. Old lye strictures have a tendency to become carcinomatous and should therefore undergo repeated cytologic studies.

Gastric cytodiagnosis is too complex for use as a general screening procedure. It is of value in gastric ulcers, antral narrowing of indeterminate cause, histamine achlorhydria, pernicious anemia, and gastric polyps. Perhaps it will prove valuable in the older age group with suspicious symptoms and negative x-ray studies. The abrasive balloon and papain lavage techniques of obtaining a specimen of gastric cells are harmless, but probably should be avoided in the presence of active bleeding, even though there has been no morbidity to date.

The cytology of duodenal drainage offers the opportunity to diagnose cancer inaccessible to the roentgen rays and other modern methods of diagnosis. Two-thirds of the carcinomas of the gallbladder, bile ducts, or pancreas exfoliate well preserved malignant cells into the duodenum, according to one study. Even in terminal cases, cytologic evidence of malignancy was obtainable twice as often as definite roentgenologic evidence. It would be desirable to examine all cases of obstructive jaundice early in their course.

The application of the cytologic method for diagnosis of malignant lesions of the colon has been proposed for lesions above the reach of the proctoscope. Preparation of the patient is of prime importance. One group of authors applied the method to 200 cases. There were 19 proved cases of cancer and 18 with positive or suspicious smears. Cell studies are most helpful in differentiating diverticulitis from cancer.

FREDERICK W. PRESTON, M.D.

The Surgical Treatment of Chronic Ulcerative Colitis. W. B. GABRIEL. *Brit. M. J.*, 1952, 2: 881.

Chronic ulcerative colitis appears to have become more common in England in recent years. It is generally agreed that from 15 to 20 per cent of cases advance to the stage where surgery becomes necessary. One of the chief problems is to decide when medical treatment should be terminated and surgery instituted. The moment for surgical assistance should not be too late or the mortality will be far higher.

There are well established indications for surgical treatment. Failure of medical treatment is an indication and this is best manifested by persistent relapse in spite of repeated courses of treatment.

Evidence of pseudopolyposis is an absolute and the most important indication for major surgery. Rectal palpation of nodules and a sigmoidoscopic view of them necessitate ileostomy and total colectomy. The sigmoidoscopic view of a contracted lumen and the absence of normal mucosa identifies pseudopolyposis and distinguishes it from the multiple bright pink polyps of varying size set in a normal mucosa which are characteristic of polyposis intestinalis. The least suggestion of mottling found on x-ray examination also indicates pseudopolyposis. More frequent x-ray studies should be made as the progress of the disease is often alarmingly rapid, as illustrated in the author's cases.

The incidence of malignant change is fairly high in long-standing cases of chronic ulcerative colitis. This varies from 7 to 27 per cent in several series of cases. This indication for surgery is characterized by its insidious onset, rapid progress, high grade of malignancy, and the fact that in every case the colitis had been present for more than 10 years.

Fibrosis or stricture formation can be diagnosed by rectal palpation or x-ray examination and is a definite indication for surgery.

Arthritis in the fingers, knees, hips, and spine also indicates ileostomy and colectomy. Surgical complications, such as intra-abdominal perforations of the colon, rectal strictures or abscesses, and spreading ulceration of the skin are all good indications for surgical intervention.

Permanent ileostomy should be followed by total colectomy in most cases. A terminal ileostomy gave the best results and facilitated the subsequent colec-

tomy. The proximal end of the ileum is exteriorized 1½ inches outside of the abdominal wall and care is taken not to close the fascia too tightly around the bowel. The ileostomy should be placed about 1 inch below and to the right of the umbilicus as this allows easy wearing of the ileostomy apparatus. A Paul's tube is used to drain the ileostomy for about 6 days and then the ileostomy aperture is dilated digitally each day to prevent stenosis. The operative mortality in 50 cases was 6 per cent.

Subtotal colectomy can usually be done 3 to 4 weeks after the ileostomy. Bilateral incisions are used to mobilize the colon and excise all but its terminal portion. Three to 6 months later, the rectocolic segment is excised from below through a perineoabdominal approach. No mortality was experienced in 21 patients, all of whom are alive and in good health.

Patients who minimize their symptoms should not be pressed toward surgery. Segmental colitis should not be treated by proximal colostomy as this usually fails and is an added barrier to the eventual total colectomy. Subtotal colectomy with ileoproctostomy is rarely done.

One-stage ileostomy and colectomy is thought to have merit and is recommended particularly for patients with pseudopolyposis and persistent blood loss. Ileoanal anastomosis has the disadvantage of an anal ileostomy. Appendicostomy is only a temporizing measure.

Ileostomy and total colectomy are well tried procedures with the best results.

ERNEST D. BLOOMENTHAL, M.D.

Adenomatous Polyps of the Colon and Rectum. WILLIAM R. SANDUSKY and JOHN ROBERT PARSONS, JR. *Ann. Surg.*, 1952, 135: 818.

Adenomatous polyps of the colon or rectum are frequently encountered; they are easy to diagnose. Their treatment, which is relatively simple both in principle and in practice, can be accomplished with minimum morbidity and mortality. But, more important, they afford an unusual opportunity for cancer prevention. This is not to imply that the adenomatous polyp raises no controversial issues, for there are a number of points relative to these lesions which are either debatable or unknown. One of these is the management of the patient who has a polyp exhibiting malignant change. It is the purpose of the authors to present the perplexities of this problem, using as a background the experience with adenomatous polyps of the colon and rectum at the University of Virginia Hospital. During the past 27 years, 202 patients with these lesions have been observed in this hospital. These cases have been studied from the standpoints of age, sex, race, frequency of recognition, symptomatology, treatment, and associated disease.

The location of the polyp has considerable diagnostic and therapeutic significance. For the purpose of localizing the lesion in this study it seems logical to consider the lower sigmoid and the rectum together, as this area is within the reach of the 25 cm. proctoscope and therefore constitutes a unit in so far as the diagnosis and therapy of polyps is concerned. It is extremely important to note that in 81 per cent of these patients both the diagnosis and treatment is possible by means of proctoscopy. The relatively small number of polyps in the colon may mean that they actually occur less frequently in this region. Also it may be due to well known difficulties inherent in their diagnosis by roentgenography. Usually it is the larger polyps that are detected.

It is the consensus of many observers that a large percentage of carcinomas of the colon and rectum begin as benign adenomas; it is also believed by some that, given time, every adenoma will show malignant change. Although there is doubt concerning the quantitative aspects of these viewpoints, there is general agreement that many carcinomas arise from benign polyps. This concept of the adenoma-cancer relationship is the basis for recommending surgical extirpation as the treatment of choice for all benign adenomatous polyps of the colon and rectum. On the other hand, this simple clarity as regards therapy is lost when one is confronted with a patient in whom there is a polyp which shows malignant change. This has been the most puzzling problem connected with the treatment of adenomatous polyps.

The lack of consistency in the management of these cases illustrates not only differences of opinion among the several surgeons who have treated the patients but also accents the dilemma surrounding the entire problem. There are reports in the literature indicating that others have been similarly perplexed. No clear-cut solution is available and recommendations concerning the treatment of choice range from simple local excision of the malignant polyp to radical segmental resection of the bowel and its mesentery for all colon polyps, whether benign or malignant.

Quotations and citations out of context often fail to present accurately the viewpoints of authors. Moreover, time may have altered the concepts formerly held by some observers. The chief value of these citations is to emphasize the perplexing nature of the problem and to point out the different opinions relative to its solution.

The uncertainty exists, at least in part, for two reasons: (1) there is lack of uniformity in the pathologic interpretation of early carcinoma in polyps of the colon and rectum, and (2) no long term follow-up of a large series of cases of this type managed by different methods has been reported.

It is obvious that in many cases local excision is adequate treatment for the polyp with malignant change, although in other cases it has failed. To eliminate some of these failures, resection of the involved segment of bowel and its mesentery would be required for all malignant polyps. But which risk is greater—the possibility of existing regional metastases or that of resection? Is there justification for subjecting every patient having a polyp with malig-

nant change to the hazards and inconveniences of radical surgery in order to salvage a few? Does the location of the lesion make any difference? In the shadow of uncertainty would one be justified in recommending partial colectomy and restoration of the intestinal continuity more readily than proctectomy and permanent colostomy? Moreover, if a rectal lesion has been removed locally, what assurance is there that follow-up by proctoscopy indicates the true status of metastatic malignancy? Does the so-called second-look operation have a place in dealing with patients in whom only local resection has been done?

What is to be the attitude of the surgeon after he has excised, locally and totally, a polyp which shows early cancer? Is he to be complacent in his accomplishment or must he advise radical surgery?

The closing of this article on a note of query emphasizes the problem of the polyp with malignant change. The authors offer no solution for it, but raise the issue in the hope that others may report their experiences and opinions and that further study of this perplexing problem may be stimulated.

BENJAMIN GOLDMAN, M.D.

Cancer of the Rectum. FREDERICK A. COLLER, RICHARD H. LILLIE, MILTON F. BRYANT, JR., and WILLIAM E. BROWN, III. *Ann. Surg.*, 1952, 135: 841.

During the 10-year period from 1935 to 1945, 1,064 patients with carcinoma of the rectum were encountered at the University Hospital, Ann Arbor. These patients were studied and followed up from 5 to 15 years. Of the entire group, 28.4 per cent were alive after 5 years, and of those patients who arrived with a lesion that was not hopeless, 54.6 per cent were alive after 5 years.

Lesions beyond hope of removal at the time the patient was first seen were present in 553 (52%) of the patients. This group represents the greatest source of future improvement by earlier diagnosis.

Of the patients treated with a chance for cure, 27.3 per cent were alive after 10 years, a survival rate which is raised to 32.3 per cent by excluding patients dying of causes other than cancer between the fifth and tenth years.

The 5-year survival rate following 435 combined abdominoperineal resections done for lesions with a chance for cure and including the operative mortality was 55.6 per cent. For 74 similarly hopeful anterior resections the 5-year survival rate was 66.2 per cent. The latter operations were done for lesions with a more favorable location.

Following combined abdominoperineal resection, recurrence appeared in 29 patients after the fifth postoperative year. None of the group subjected to anterior resection died of recurrence after the fifth year. This demonstrates that lesions in the lower rectum may spread more widely than the limits of radical removal and recurrence may remain confined to this area for a considerable period of time. With these 29 patients in mind, it does not seem logical to perform a less radical operation than combined abdominoperineal resection for rectal cancer.

HAROLD LAUFMAN, M.D.

Construction of a Rectal Sphincter and Restoration of Anal Continence by Transplanting the Gracilis Muscle. KENNETH L. PICKRELL, T. RAY BROADBENT, FRANK W. MASTERS, and JAMES T. METZGER. *Ann. Surg.*, 1952, 135: 853.

The gracilis muscle was transplanted in 4 cases of rectal incontinence in children for the purpose of reconstructing a sphincter. These 4 children were all born with spina bifida which resulted in anal incontinence. The nerve and blood supply of the gracilis muscle is left intact, but true automatic function does not result. The use of the new sphincter is more a voluntary control than an automatic one.

HAROLD LAUFMAN, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Early Results Following Therapeutic Ligation of the Hepatic Artery. ARTHUR I. CHENOWETH. *Ann. Surg.*, 1952, 135: 756.

Experimental observations which provide a rationale for the procedure of therapeutic ligation of the hepatic artery in cirrhosis of the liver are cited. An account is given of the few clinical cases thus far reported, and 2 additional cases are reported in detail in which the procedure was utilized for the control of massive hemorrhage from esophageal varices.

The use of the makeshift balloon tampon in 1 case may have been a life-saving procedure. If the excellent balloon tampon described and used by Sengstaken had been available, it would have been of great value not only in 1 case but in other cases as well. Certainly the use of this type of tamponade is indicated in dealing with such cases, regardless of the definitive treatment to be adopted later. Judged by the experiences of Sengstaken and Blakemore, it provides the means of successfully controlling hemorrhage while the condition of the patient is fortified by transfusions, vitamins, and general care.

The first case seen 3 months after operation showed no ascites; the liver edge was barely palpable; the spleen was not palpable; and there was no bruit audible in the epigastrium. The patient has been well to date. The second patient showed no recurring episodes of hemorrhage after leaving the hospital 7 months after the operation.

Attention is called to a vigorous machinerylike thrill along the course of the hepatic artery in 2 patients, manifested also by an audible bruit in the epigastrium of the second patient. This bruit may be of significance in portal hypertension.

In the discussion of the article, Rienhoff, Jr., of Baltimore, reported 15 cases observed by him with 2 deaths. He ligated the hepatic artery in half of the cases, distal to the origin of the gastroduodenal artery, and of the left gastric artery as well. The selection of the site will depend on an estimation of

the extent of the cirrhosis, the clinical condition of the patient, and the size of the gastroduodenal artery. If the patient is very ill and the disease is far advanced, with little liver tissue left and the gastroduodenal artery relatively small, proximal ligation is done. If, on the other hand, the reverse holds true, ligation is done distal to the origin of the gastroduodenal artery.

CHARLES BARON, M.D.

Acute Pancreatitis. The Significance of an Associated Hypertension. IAN HEINZ. *Austral. N. Zealand J. Surg.*, 1952, 21: 283.

Sixty-four cases of acute pancreatitis were studied and analyzed. The average age of the patients was 55 years, the youngest being 21, and the oldest, 82 years. Thirty were males and 34 were females.

Two types of lesions occur even in the early stages of the disease. The pancreas is found to be swollen and edematous at operation; at autopsy it is seen to have areas of necrosis throughout its substance. This lesion is accompanied by a strawberry-colored peritoneal exudate, or the pancreas and mesentery are stained green with extravasated bile. The other manifestation of the disease is a hemorrhagic lesion of the pancreas, with a blood-stained exudate into the peritoneal cavity. This type is more severe and has a worse prognosis. Thirty-five of the cases were associated with a lesion of the extrahepatic biliary tract.

Reflux of bile into the pancreatic duct has long been held to be the most common cause of acute pancreatitis. But no one theory can adequately explain the genesis of the disease. In many cases the pancreas has the typical appearance of an infarcted organ.

In an attempt to determine whether hypertension was an etiological factor in acute pancreatitis, the blood pressure of the patients with acute pancreatitis was compared with that in a series of patients with perforated gastric ulcer. The latter were chosen because they were of a comparable age and in a comparable degree of shock. It was found that both the systolic and diastolic pressures of the patients with acute pancreatitis were significantly higher than were those of patients with perforated peptic ulcer.

It is suggested that the lesion in acute pancreatitis is often due to infarction, as a result of primary vascular disease. This hypothesis is supported by the fact that vascular disease is present in a significant number of cases, the fact that infarcts have been found experimentally and resemble the clinical condition both macroscopically and microscopically, and by the fact that the clinical condition is seen in circumstances similar to those in which other infarctions occur, e.g., cardiac infarction.

The diagnosis was based on the well known clinical syndrome of the disease, and on studies of the urinary diastase. The serum amylase was not estimated in any of the patients. A urinary diastase of 60 units or more is significant. The height of the reading seems to be directly related to the severity of the disease. Laparotomy as a diagnostic measure is only a further hazard to the patient and may aggravate any destructive lesion in the pancreas, especially when it is on a vascular basis.

A tabulation of the results of treatment makes it apparent that conservative measures should be adopted when possible. The doubtful etiology is a further argument against operative treatment.

SAMUEL KAHN, M.D.

Islet-Cell Adenoma of the Pancreas. HAROLD BROWN, HAROLD P. HARGREAVES, and FRANK H. TYLER. *Arch. Int. M.*, 1952, 89: 951.

About 400 cases of islet-cell adenoma of the pancreas have previously been reported in the literature. The authors' case was that of a 58-year-old man with marked hypoglycemia of 8 years' duration. Courses of ACTH therapy on two occasions and of cortisone on two occasions produced relief from hypoglycemic symptoms, elevation in the fasting blood sugar levels, and alteration of glucose tolerance curves toward normal. Following the injection of 0.1 mgm. of ephedrine per kilogram of body weight there was a marked rise in the blood sugar levels when the patient was not receiving therapy. Response to the same dose was less when the patient was receiving 200 mgm. of cortisone daily, and the response was still less after surgical removal of the islet-cell adenoma.

The condition in this patient was an islet-cell adenoma situated in the uncinate process of the pancreas. The mass upon removal measured 2.8 by 2.3 by 1.9 cm. and weighed 6 gm. A biopsy of the liver showed normal histology.

The fundamental difficulty in this patient was an oversupply of insulin. The pituitary gland apparently functioned normally as shown by lack of signs of hypopituitarism and by the ability of the adenohypophysis to respond to epinephrine stimulation by effecting a drop in the eosinophile count through the mediation of the adrenal cortex. The adrenal cortex showed no involvement, as judged by normal 17-ketosteroid excretion and an eosinophil drop of 76 per cent on corticotrophin stimulation.

Studies of the nitrogen balance during cortisone therapy indicated that the correction of hypoglycemia could not be attributed to the protein catabolic effect of the cortisone, but was presumably due to an anti-insulin effect in the tissues.

FREDERICK W. PRESTON, M.D.

Splenic Puncture. JYOTI B. CHATTERJEA, CARLOS MEZA ARRAU, and WILLIAM DAMESHEK. *Brit. M. J.*, 1952, 2: 987.

The authors described a simple technique of splenic puncture; their procedure is simple enough to justify its use as a routine procedure in the diagnosis of splenomegalies of uncertain origin. The procedure is usually less painful than a sternal puncture. Splenic puncture with the Vim-Silvermann needle as advocated by Block and Jacobson carries with it

a definite risk. Among 92 punctures performed on 55 patients in their series, hemorrhage from the spleen occurred in 4, and there were 2 deaths.

Splenic puncture is indispensable in the diagnosis of myeloid metaplasia. The association of a fibrotic or sclerotic bone marrow with extensive myeloid metaplasia of the spleen is an absolute contraindication to splenectomy, the spleen in these cases representing the major hematopoietic tissue. The authors found evidences of myeloid metaplasia in some cases of polycythemia vera and chronic granulocytic leucemia, and in 1 case of cirrhosis of the liver. The increased number of erythroblasts found in some patients with chronic lymphatic leucemia, acquired hemolytic anemia, and cirrhosis of the liver is probably indicative of small ectopic foci of erythropoiesis. Their presence in association with a cellular or hypercellular marrow does not necessarily contraindicate splenectomy, and the recommendation for splenectomy in these cases should be based solely on the fundamental disease and on the presence of associated hemolytic anemia. Similar remarks apply to a slight increase in immature granulocytes in a splenic smear.

Splenic puncture is also very useful in the diagnosis of atypical or cryptic types of aleucemic leucemia and leucosarcoma, in which the marrow picture may not be completely diagnostic or may even be normal. This is particularly the case in primary lymphosarcoma and in reticulum cell sarcoma of the spleen, in which splenomegaly may be the only abnormal finding. In congestive splenomegaly due to various causes such as cirrhosis of the liver, corroborative evidence in favor of the diagnosis is often provided.

Patterns of the splenogram in 43 patients with different blood diseases are given by the authors.

ROBERT TURELL, M.D.

Surgical Aspects of Hypersplenism. ROBERT M. ZOLLINGER, MARY M. MARTIN, and ROGER D. WILLIAMS. *J. Am. M. Ass.*, 1952, 149: 24.

Hypersplenism which may be alleviated or cured by splenectomy is discussed in relation to the necessary surgical safeguards. Since the details in preoperative, operative, and postoperative care often are dependent upon the type of blood dyscrasia involved, the surgeon must first have the hematologist delineate the particular blood element or elements involved in the hypersplenic state.

There are two types of hypersplenism, primary (if congenital or hereditary), and secondary (if it occurs as a complication of a chronic disease). Red cell destruction produces thrombocytopenic purpura; neutrophil destruction produces neutropenia; and, if all three cell elements of the blood are destroyed, pancytopenia results. Splenectomy in this group usually effects a cure of the primary hypersplenic syndrome.

Secondary hypersplenism produces the identical clinical picture as primary hypersplenism but occurs subsequent to a number of chronic disease processes such as Boeck's sarcoid, chronic leucemia, Hodgkin's disease, and infection. Splenectomy in this type of case may prolong life or establish a more favorable hematologic state; however, it will not alter appreciably the eventual outcome of the disease.

On the general surgical service of the Ohio State University Hospital, there were 144 consecutive patients with primary or secondary hypersplenism in the period from 1946 to 1951. There were 90 patients with primary hypersplenism and 54 patients with secondary hypersplenism. Splenectomy was performed in each instance.

Particular emphasis has been placed on the necessity of close teamwork between the hematologist and the surgeon for the best possible results. The diseases included under both primary and secondary hypersplenism are discussed from the viewpoints of incidence, age groups, special problems in preoperative care, and results.

Despite differences in the preoperative conditions affecting surgical risk, the preparations for splenectomy in cases of primary and secondary hypersplenism are similar. Individual attention is given to the specific cytopenias, with particular emphasis on the patient with thrombocytopenic purpura and anemia. Patients with purpura have a predisposition to hemorrhage. Although fresh whole blood transfusions may raise the platelet count, the patients must frequently be subjected to emergency splenectomy despite the absence of platelets.

Patients with hemolytic anemia present a special and trying problem. Despite severe anemia, preoperative transfusions are usually contraindicated in view of the danger of precipitating a hemolytic crisis. The precipitation of a crisis by transfusion is a greater danger than splenectomy in a patient with a very low red cell count. Transfusion is avoided until after ligation of the splenic artery. As soon as the splenic artery is ligated, the hemolysis stops and transfusions may be given safely.

The use of antibiotics to control frequently recurring infections in patients with splenic neutropenia is of great importance. Transfusions may be given but no significant rise in the white blood count is effected. Special problems involving anesthesia, intubation, positioning, and detailed technique are discussed.

When secondary neutropenia is associated with Banti's disease, routine painstaking technique in splenectomy, including delayed ligation of the splenic vein, has made possible the making of a venous shunt if portal hypertension is present. Careful search for accessory spleens, and routine liver and lymph node biopsies are recommended.

Complications occurred in 6.6 per cent of the patients with primary hypersplenism and in 21 per cent of the patients with secondary hypersplenism.

The over-all postoperative mortality was 5.5 per cent; the mortality in 90 patients with primary hypersplenism was 1.1 per cent, and in the 54 patients with secondary hypersplenism, 13 per cent. Excellent results were realized with splenectomy in cases of primary hypersplenism, while satisfactory

but poorer results occurred in the cases of secondary hypersplenism. MARY M. MARTIN, M.D.

MISCELLANEOUS

Abdominal Wounds in Jungle Warfare. JOHN A. BATY. *Brit. J. Surg.*, 1952, 39: 388.

In this article the author discusses, in addition to his method of treating intra-abdominal wounds, the difficulties that are encountered in jungle surgery. His operative procedures are those of most well trained surgeons and there is no need to elaborate upon them. Jungle warfare made it difficult to provide for short time intervals between the moment of injury and the time of surgery. A wounded man may have been many hours in the thick jungle after injury before he was found. When found, a formidable journey lay ahead, including perhaps a 10 to 15 mile hand carriage via precipitous gradients, thick jungle, wide chaungs, and mud, with torrential downpour or blazing heat adding to the difficulties. Many patients arrived at the surgical units in a very bad state, either cold and soaked from exposure during the monsoon, or dehydrated and pyrexial at other times.

The author believes that operation at extremely forward sites, where the patient cannot be kept for 7 to 10 days before evacuation, is useless, since evacuation shortly after major abdominal surgery is very poorly tolerated. Postoperative nursing difficulties will be appreciated from the fact that only sepoys without special training were available. After the operation, the patients were liable to have their nights disturbed by close fire of various types, and during the day heat and flies made afternoons particularly trying.

The author pays special tribute to the bearer units for their excellent work under conditions which must have equaled the world's worst.

ELY ELLIOTT LAZARUS, M.D.

Discussion on Hiatus Hernia. F. AVERY JONES, N. R. BARRETT, A. S. JOHNSTONE, R. H. FRANKLIN, and OTHERS. *Proc. R. Soc. M.*, Lond., 1952, 45: 277.

The apparent increase in the incidence of hiatus hernia is probably the result of greater awareness of its existence. Roentgenological diagnosis can best be established when the patient is given the barium meal in a horizontal position. For this reason, many cases have been missed. Three general types of hiatus hernia are recognized: (1) congenitally short esophagus producing a thoracic stomach; (2) paraesophageal hernia, in which a portion of the fundus herniates through the hiatus alongside the esophagus; and (3) esophagogastric hernia, in which the lower end of the esophagus and part of the fundus of the stomach herniate into the chest. These hernias may progress in two ways and are designated as sliding hernias, corresponding to the esophagogastric type, or a rolling hernia, corresponding to the paraesophageal type. A hiatus hernia may be a combination of the two types.

Patients may be asymptomatic or have incessant pain or dysphagia, dyspnea and palpitation, diaphragmatic painful spasm due to the irritation of the diaphragm, esophageal inflammation or ulceration, frank hematemesis, retrosternal discomfort, or various symptoms associated with food, such as flatulence and belching following meals. Operative intervention is rarely undertaken. Simple measures such as restraint of stooping, sleeping with shoulders raised by pillows, proper diet with small meals, and olive oil taken before, and antacids taken after, meals should adequately control the position. Surgery is considered advisable in about 1 per cent of the patients.

It is pointed out by one of the discussants that the common type of hiatal hernia is the sliding variety and that a complete understanding of the condition present is important. Since the esophagus is not closely applied to the margins of the hiatus, the hernia probably occurs as the result of increased abdominal pressure caused by contraction of the abdominal musculature in conjunction with a relatively negative intrathoracic pressure. The left gastric artery passes through a long mesentery in patients with hiatal hernia. Normally this mesentery is short, but it may be that the major mechanism of hiatus hernia is the elongation of this mesentery which fails to maintain the stomach in its normal position. In the sliding type of hernia, surgical correction requires that the parts be fixed in such a way that herniation does not recur and provides for a competent sphincter by leaving the cardiac incisura properly placed and free to allow effective function of the cardiac sphincter mechanism.

Roentgenological diagnosis of hiatus hernia is not entirely reliable. Small projections to the left of the esophagus about the diaphragm indicate a hernia, especially if a concavity is noted on the greater curvature in an erect position. Roentgenological examination of the incisura is also sometimes helpful; however, various dilatations often recur normally at the lower end of the esophagus and differentiation of the gastric and esophageal mucosa is not always possible. Patients must be examined in a horizontal position when given the barium meal. It is believed that gastric reflux into the esophagus is responsible for most of the symptoms caused by hiatus hernia. However, it is difficult to explain why reflux takes place in some individuals who have no signs of hernia and why hernia may be easily demonstrated at one examination but not at another.

In the event a stricture has not formed as a result of the hernia-induced esophagitis, simple medical treatment similar to that followed in duodenal ulcer should be employed. If a stricture has formed or a chronic gastric ulcer is present in the thoracic stomach, surgical resection of the affected portion is indicated.

Another discussant pointed out that the action of the diaphragm cannot be ignored in the functioning of the sphincter mechanism. He believes that the diaphragm is the major component because thick

muscle fibers from the right crux encircle the cardia, barium is held at the cardia during inspiration, esophagoscopy shows action of the diaphragm, and it is possible to feel the action of the diaphragm at the time of surgery, particularly if the phrenic nerve is stimulated. CURTIS ARTZ, M.D.

The Nonspecific Inflammatory Ileocecal Tumors
(Die unspezifisch entzuendlichen Ileocoecaltumoren).
G. BERNHART. *Helvet. chir. acta*, 1952, 19: 1.

Ten cases of nonspecific inflammatory tumors of the ileocecal region are reported. These were inflammatory tumors which afforded no evidence of the presence of neoplasm, tuberculosis, syphilis, or of actinomycosis. The histologic pictures of these cases were all more or less alike, consisting of fibrinous and fibrous infiltrative tissue, with an admixture of leucocytes, lymphocytes, plasmocytes, and in instances eosinophils, producing at times marked thickening of the submucosa and usually a less marked involvement of the muscular and subserous layers. The mucosa was usually intact; the serosa was covered with masses of fibrinous deposits, in part matured into fibrous tissue and in part showing extensive adhesions with the surrounding structures.

While the histologic picture is clear and definite, the cause is confused and uncertain. At present the best that can be said is that various primary diseases of the intestine may lead to nonspecific inflammatory tumors. On the basis of the cases reported in the literature and the author's own personal experience, he classifies the tumors into one group consisting of enteritis phlegmonosa, ileitis regionalis (Crohn), colitis regionalis (Uehlinger) and primary typhlitis. The last condition is regarded by the author as originally cited by himself (4 cases); a second group consisting of Graser's diverticulitis and peridiverticulitis (1 case); a third group consisting of conditions with traumatic (internal and external) causes; a fourth group consisting of localized colitis ulcerosa (3 cases); and a fifth group consisting of appendicogenic ileocolitis (appendicitis fibroplastica of Laewen).

Three of these 10 cases were of acute character in which conservative surgery with modern chemotherapy and antibiotic therapy procured a satisfactory result. The more chronic instances were treated in the radical ways in which neoplasms of the intestines are usually treated (excision of the ileocecal region and ascending colon, followed by end-to-end anastomosis between the ileum and the transverse colon according to Puig and Reseda. Such extensive resections were done under the protection of penicillin, aureomycin, and the sulfonamides. There were no deaths.

The author is aware of the gloomy picture recently painted by Crohn (3 cases, 2 deaths from recurrence, 4 recurrences); however, in this reported material there has been no evidence of recurrence. Several of the cases are of too recent origin to permit definitive judgment. It is hoped that the chemotherapy and antibiotic therapy may influence the incidence of recurrence as well as the immediate operative mortality. JOHN W. BRENNAN, M.D.

GYNECOLOGY

UTERUS

Primary Adenocarcinoma of the Cervix. THOMAS K. HEPLER, MALCOLM B. DOCKERTY, and LAWRENCE M. RANDALL. *Am. J. Obst.*, 1952, 63: 800.

On the basis of a review of the literature and a study of 164 cases of primary adenocarcinoma of the cervix, the authors concluded as follows:

1. This neoplasm represents approximately 4 to 5 per cent of all carcinomas of the cervix.

2. The average age of occurrence of this neoplasm is about 50 years, which corresponds to the average age of occurrence of squamous cell carcinoma of the cervix.

3. The occurrence of carcinoma of the cervix in patients less than 20 years of age is rare. One such case was included in the authors' series. On the basis of Pollack and Taylor's collected series of such cases, one would conclude that the great majority of cervical carcinomas in young persons are adenocarcinomas.

4. As would be expected, the symptoms presented by patients with this tumor are not unlike those presented by patients with squamous cell carcinoma of the same organ.

5. Pain as a symptom can usually be interpreted as indicating rather extensive involvement by the neoplastic process.

6. The stage of anatomic involvement is the best known prognostic index to this type of cancer.

7. The gross appearance of adenocarcinoma presenting at the external os is not unlike squamous cell carcinoma of the cervical labia.

8. The histologic structure is extremely variable, which makes an absolute differentiation between primary endometrial and primary cervical adenocarcinoma impossible by histologic examination alone.

9. Adenocarcinomas are apparently more radioresistant than are squamous cell carcinomas of the cervix.

10. In selected cases, operative treatment with or without supplemental radiotherapy, as indicated, is the treatment of choice.

Causes of Death in Carcinoma of the Cervix, Influencing Modern Trends in Treatment. SIMON V. WARD, THOMAS BENTON SELLERS, and JULIUS T. DAVIS, JR. *Am. J. Obst.*, 1952, 63: 989.

The records of 248 patients with carcinoma of the cervix, who died in the Charity Hospital of Louisiana at New Orleans between the years of 1938 and 1950 were reviewed. Most of them had received their previous treatment at this institution and were readmitted for terminal care. There were 164 colored and 84 white patients.

The listed primary causes of death were uremia and pyelonephritis (51.6%), hemorrhage (13.7%), carcinomatosis and cachexia (11.3%), cardiovascular causes (8.1%), peritonitis (3.2%), other causes (7.3%), intestinal obstruction (4.8%). Ureteral obstruction was found in 60.9 per cent of the patients, although it was not always the cause of death. With regard to the 70 autopsy cases, distant metastases were found in 32.9 per cent of the patients. In the remaining 178 cases, distant metastases were diagnosed clinically in 14.1 per cent of the patients. The lungs, liver, and bone were the most common sites of metastatic disease.

Operative procedures for the relief of pain and hemorrhage were frequently carried out. Transfusion was universally more satisfactory for the relief of bleeding than was surgery. Prefrontal lobotomies, caudal resections, spinal injections of dolamine, alcohol injections, and other procedures for the relief of pain were used and were often unsatisfactory. Twenty-nine surgical operations were performed for reasons other than hemorrhage or pain; in this group there were 13 deaths within 30 days or less from surgery.

It was concluded that 65.3 per cent of the patients dying with carcinoma of the cervix died as the result of urinary obstruction or hemorrhage. Early surgical intervention is the only hope for prolonging the lives of these patients. This may be either in the form of early radical surgery designed for cure, or palliation by diversion of the urinary stream.

ARTHUR L. HASKINS, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Recent Experimental Investigation on the Genesis of Ovarian Tumors (Neuere esperimentelle Untersuchungen ueber die Genese der Ovarialtumoren). O. MUEHLBOCK. *Geburtsch. & Frauenh.*, 1952, 12: 289.

Until recent years the genesis of ovarian tumors has been a mystery. Recent investigations with mice and rats have thrown some light on the problem, especially since spontaneous ovarian tumors in experimental animals are quite rare.

The following methods have been used:

1. Roentgen irradiation. It has been demonstrated that subjecting infantile female mice to small doses of x-rays over the whole body leads to the formation of ovarian tumors in several years.

2. Ovarian implantation in the spleen. Castrated female mice bearing intrasplenic ovarian transplants also develop ovarian tumors presumably because of the fact that estrogen is metabolized in the liver and high gonadotrophin levels result. The development of these ovarian tumors can be prevented by the parenteral injection of estrogen.

3. Parabiosis. Two animals (mice) are joined in parabiosis by the lateral abdominal walls and the scapular and iliac areas. The estrogenic hormone

is rapidly broken down while gonadotrophins remain longer in the circulation; in addition, the latter diffuse through the capillary walls more easily than the former. In this way a high level of gonadotrophin is obtained and ovarian tumors result.

Three types of tumors result from the above techniques: granulosa cell tumors, luteomas, and tubular adenomas. The granulosa cell tumors and occasionally the luteomas produce estrogen.

The significance of these findings with respect to the human female is not clear. The author reports several cases of women who were castrated by roentgen irradiation and later developed granulosa cell tumors. No one yet knows the effects of atomic radiation in this respect. Incidentally, granulosa cell tumors occur in the main in postmenopausal women when gonadotrophin is high.

WARREN R. LANG, M.D.

MISCELLANEOUS

Use of the Vaginal Smear as a Screening Test. HERBERT L. LOMBARD, MARGARET MIDDLETON, SHIELDS WARREN, and OLIVE GATES. *N. England J. M.*, 1952, 246: 523.

The authors began a long range study, from the administrative standpoint, of the use of the vaginal smear for the diagnosis of uterine cancer to determine whether it should be added to the other services offered to the physician and the public, whether the service should be made available to the cancer clinics either as a screening test for all female patients or as an additional diagnostic procedure for women with gynecological conditions, and whether the test should be ignored in the official program.

A single vaginal smear was taken from each female who attended the cancer clinics in Massachusetts from January 1, 1945 to June 30, 1947. Three years after the original smear, a follow-up history, a pelvic examination when possible, and a repeat smear were to be obtained in these same patients.

Three interpretations of the smear were used in the study: namely, negative, positive, and questionable. Biopsy and curettage scrapings were requested from persons with positive or questionable smears unless these had already been obtained.

Women showing carcinoma on biopsy or curettage were not followed up for this study. Three years after the original smear, the clinical records were reviewed and the patients were contacted if possible.

At the time of the 3-year follow-up repeat smears were taken from 42.8 per cent of the women in the series. Agreement between the two smears was found in 91.1 per cent of the cases. The 8.9 per cent showed disagreement as follows:

In 5.4 per cent of the cases the first smear was questionable and the repeat smear was negative, and in 2.5 per cent the first smear was negative and the second smear was questionable. In 0.3 per cent of the cases the first smear was negative and the second smear was positive, and in 0.7 per cent the first smear was positive and the second smear was negative.

Of the total number of 3,581 records all but 2,495 were discarded for some cause, and this remainder form the basis of this study.

The cost of collection and examination was slightly over $3.00 per specimen. The group of 1,654 women with no gynecological symptoms were found to have 9 cancers, 3 of which were discovered by the smear, at a cost of $1,700 apiece. If this service were furnished to all adult females in Massachusetts, the cost would be greater than the combined costs of all cancer services now provided. It was, therefore, considered impractical to use the vaginal smear as a routine screening procedure.

The incidence of cancer among women with no gynecological symptoms was less than 1 per cent and among those with other gynegological symptoms about 10 per cent. If questionable smears were considered positive, the over-all error in symptomless patients would be at least 4 per cent and among patients with bleeding at best 16 per cent. If the questionable smear were omitted erroneous diagnoses would amount to less than 1 per cent among symptomless patients and to nearly 8 per cent among those with bleeding. The questionable diagnosis was four times as numerous in the bleeding group, which impairs its value.

The authors state that this study was made merely to evaluate the vaginal smear as a screening test, and not to detract from its value.

BYFORD F. HESKETT, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

The Etiology of Periodical Metrorrhagia or False Menstruation of Pregnancy. Its Relationship to Disease Conditions. JOHN G. KAMBOURAKIS. Thesis, University of Salonika, Greece.

More than 1,230 women were observed by the author. Among these women, 60 (4.47%) had once or repeatedly shown periodical metrorrhagia or false menstruation during pregnancy, and had presented another abnormal condition of some kind at the same time.

Of this group, 86.66 per cent were individuals of psychopathic or superemotional temperament (congenital in 78.33% and acquired in 8.33%) who showed the effects of intense and prolonged psychic strain. The remainder (13.34%) were under physiological strain and showed the same degree of fatigue.

The great frequency of some findings in these women as compared to their frequency in those not having metrorrhagia during pregnancy revealed the relationship of these findings to the condition of the patients. These findings consisted of goiter, 18.33 per cent and 1.78 per cent, respectively; dysmenorrhea before marriage, 48.33 per cent and 21.64 per cent, respectively; vitiligo, 3.33 per cent and 0 per cent, respectively; and epistaxis, 1.66 per cent and 0 per cent, respectively.

Thirty of the women with periodical metrorrhagia of pregnancy were examined by a neurologist and they revealed, in addition to the pregnancy, disturbances of the neurosympathetic system, anxiety, and hysteria. One woman presented a depressive psychosis and another presented melancholia with anxiety.

The author points out that the metrorrhagias occur only at the time that menstruation would occur, and only very seldom do they occur at another time. He suggests that further investigations of this subject would be of value.

Considerations on the Pathogenesis of Varicosities During Pregnancy (Considérations pathogéniques sur les varices de la grossesse). P. PIULACHS, F. VIDAL-BARRAQUER, and J. M. BIEL. *Lyon chir.*, 1952, 47: 263.

The incidence of varicosities during pregnancy vary a great deal, according to reports in the literature. Much of this variation can be accounted for by the fact that many authors include vascular engorgement under the heading of varicosities. The authors noted that about 50 per cent of their patients had vascular dilatation, while about 10 per cent of their patients had marked varicosities. Several theories have been advanced to explain the development of varicosities during pregnancy. The principal theory has been that of mechanical compression of the vena cava by the gravid uterus. As an argument against this pathogenesis it is pointed out that in many cases varicosities appear before the uterus is of sufficient size to cause compression, and that varicosities often fail to develop in patients who are not pregnant but who carry uterine myomas large enough to cause compression.

Another mechanism for the development of varicosities is the possible action of progesterone and a pituitary hormone on the blood vessel walls. Still another explanation which is widely accepted is that incompetent valves account for the development of varicosities during pregnancy. However, a study of phlebograms shows that the valves in many cases are still competent even in cases with marked varicosities.

The authors believe that while hormones may have some action on the walls of veins in causing relaxation, the true explanation for the development of varicosities is that progesterone acts upon the glomus of Masson, which controls the multiple arteriovenous shunts which can be demonstrated just beneath the skin in the hands, feet, legs, and external genitalia.

Arteriographic study demonstrates multiple small dilated areas at the tip of small-sized arteries which might possibly represent the site of origin of the arterial venous shunts. As a result of the evaluation of venous pressure, the oxygen content of venous blood, and the Trendelenburg test, the authors concluded that the varicosities were formed as a result of increased tension within the superficial veins of the leg. This tension was brought about by the opening up of the multiple arteriovenous connections.

The management of such varicosities is a conservative one. Compression bandages, sclerosing solutions, and histidine with ascorbic acid seem to be most effective in the relief of symptoms and in the control of the varicosities.

GEORGE C. LEWIS, JR., M.D.

Chronic Ulcerative Colitis and Pregnancy. MARCEL PATTERSON and ERNEST J. EYTINGE. *N. England J. M.*, 1952, 246: 691.

Sixteen cases of ulcerative colitis and pregnancy encountered at the Lahey Clinic are reviewed. The authors realize that the group of cases is small, but hope that the article will stimulate interest for future reviews. Detailed questionnaires were sent to these patients concerning the course of their pregnancy. All patients were seen before, during, or after their pregnancies. The authors divide the cases into 3 groups:

1. Patients with active colitis at the onset of pregnancy.
2. Patients with inactive colitis at the onset of pregnancy.
3. Patients developing colitis during pregnancy.

In group 1, four patients thought their condition had improved, 3 thought the colitis was aggravated, and 1 said that there had been no effect. In group 2, two patients thought the pregnancy had no effect and 1 patient believed the colitis was aggravated. In group 3, one patient had two pregnancies but no viable children, 1 patient died after miscarriage at the sixth month, 1 patient experienced a complete remission of the colitis, and 2 patients had regression of the colitis (1 required ileostomy and 1 developed rheumatoid arthritis).

Pregnancy which occurs during a mild or moderately active stage of colitis produces variable effects. Pregnancy occurring during an inactive stage of colitis is well tolerated. Ulcerative colitis developing during pregnancy is very severe and may be fatal.

JACK W. THOMPSON, M.D.

Hodgkin's Disease in Pregnancy, with a Report of 12 Cases. JAMES P. HENNESSY and ANTONIO ROTTINO. *Am. J. Obst.*, 1952, 63: 756.

Fifty-two cases of Hodgkin's disease in pregnancy have been reported in the literature and the authors add 12 cases seen at St. Vincent's Hospital, in New York.

Hodgkin's disease apparently does not affect ovulation, fertility, the incidence of abortion, or antepartum or postpartum hemorrhage. Pregnancy has no apparent effect on the over-all incidence of exacerbations. Hence, the interruption of pregnancy is not indicated. The review of the literature reveals only 3 reported cases of Hodgkin's disease in young infants born of mothers with the disease.

Roentgen therapy (with adequate shielding of the fetus) and other forms of therapy used in the treatment of Hodgkin's disease exert no untoward effect on pregnancy or the fetus. All of the patients received nitrogen mustard therapy except 3 treated with triethylenemelamine. ALAN RUBIN, M.D.

LABOR AND ITS COMPLICATIONS

With Reference to the Crisis in the Matter of Indications for Cesarean Section (Zur "Krise" der Kaiserschnitt-Indikation). HUGDIETER NOACK. *Geburtsh. & Frauenh.*, 1952, 12: 104.

From January 1, 1937 to March 31, 1951, 1,115 cesarean sections were performed on a total material of 46,409 births. These operations were done at the University Gynecologic Clinic, Leipzig, Germany. In this material the indications for operation were much the same, in the sense that the service during this entire period was under the direction of the same specialist (Prof. Robert Schroeder). This number of operations corresponds to a general percentage of 2.4 per cent for the entire period.

The technique used here has consisted in nearly every instance of the usual intraperitoneal route with transverse incision of the uterine isthmus. The abdominal incision employed has been that of Pfannenstiel.

The effect of the antibiotic era on the prognosis of the operation has enabled a broader application of the method, yet the percentage of performance has been kept down, mainly by the fact that the author's collaborators have consistently adhered to the principle of giving the natural birth forces a trial (test of labor); that is, in instances such as disproportion, complete dependence has not been placed upon roentgenological measurements and other nonfunctional criteria. Nevertheless, this insistence upon the adherence to the test of labor has not prevented an early induction by artificial rupture of the membranes in instances in which the interests of the child have seemed to demand it.

The impact of the antibiotic era (the sulfonamides seem not to have exerted any notable effect on the general mortality statistics for this operation) on the percentage of maternal deaths during the years 1939 and 1940 is shown by a table comparing the preantibiotic with the antibiotic eras. Thus it is shown that in the years 1937 to 1948 the general percentage of maternal mortality for cesarean sections was 6.3 ± 0.8; on the other hand, during the years 1939 and 1940 the percentage of maternal mortality dropped to zero; that is, there were no maternal deaths as the result of cesarean section during this latter period.

Another event which has exerted a marked ameliorative effect on the prognosis with reference to the patient subjected to cesarean section has been the introduction of peridural anesthesia.

On the whole, however, the author does not think that his experiences as statistically tabulated (the author and his collaborators have been subjecting their results to the analysis of a computing machine) indicate any "crisis" in the matter of indications for cesarean section. His service is still attempting to avoid, in eclampsia cases, the summation of the traumas of operation and the metabolic decompensation. Only in the uninfluenceable toxicoses is the cesarean section resorted to. The operation on old primiparas to avoid possible loss of the child's life is not done so frequently as to affect the general statistical picture. The operation has not been able to influence, in a marked degree, the infant mortality statistics, since so large a proportion of these deaths are the result of premature delivery and of malformations.

The cesarean section still remains an operation which is formidable for the mother in the matter of primary and of late morbidity. Nevertheless statistical considerations should not cause the physician to hesitate in resorting to the operation of cesarean section for the preservation of the life of the child.

JOHN W. BRENNAN, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Surgery of the Horseshoe Kidney. OSWALD S. LOWSLEY. *J. Urol.*, Balt., 1952, 67: 565.

The fused kidney presents an important clinical problem because of its relative frequency and its susceptibility to disease. A majority of the horseshoe kidneys seen clinically have hydronephrosis on one or both sides with some degree of infection. Once a horseshoe kidney becomes diseased there is little hope of permanent relief except from surgical intervention. In Lowsley's series there were 46 cases observed in pyelograms among 13,080 patients, or an incidence of 1 to 284. In horseshoe kidney the renal organs are situated on either side of the spinal column, their lower poles usually being united by an isthmus which crosses the medial line at the level of the fourth lumbar vertebra or lower. Not only are the kidneys displaced downward but they also lie closer to the spine. The pelves usually face anteriorly or mesially, or they may face laterally and away from each other with the ureters far apart. The calyces are atypically arranged and may point inward toward the spinal column, downward, or both. The ureters enter the pelves higher up than in nonfused kidneys; they arise from the inner border of the upper part of each kidney and pass over the anterior surface of the renal mass. In more than 90 per cent of the cases the isthmus consists of renal parenchyma of considerable breadth and thickness, and usually lies in front of the aorta and vena cava. There is great variation in the origin, number, and size of the arteries and veins supplying each renal mass. The vessels may arise from the nearest great vessels.

The cases may be grouped as follows:

1. Horseshoe kidneys with no renal abnormality other than fusion and no symptoms are the most common types and surgery is not indicated.

2. Horseshoe kidneys with secondary renal lesions are the most common types diagnosed clinically; hydronephrosis, infection, and calculus are the most frequent lesions.

3. Horseshoe kidneys with no secondary pathologic change, but with definite symptoms referable to the anomaly itself are not numerous; the predominant symptom is pain in the umbilical area (with or without gastrointestinal disturbances) due to pressure upon the great vessels and adjoining nerves by the isthmus or the ectopic renal masses.

Lowsley's operation consists of (1) division of the isthmus, (2) ureteropelvioplasty, or dilatation of the ureter by a splinting catheter brought out through a nephrostomy wound, as indicated, and (3) elevation of the kidney by nephropexy. The patient is placed on his side with the loin on the stretch. An incision is made from the costovertebral angle downward and inward for 20 cm. The usual fascia-muscle layer division is made, and after mobilization of the kidney, the numerous aberrant vessels are ligated. The isthmus is isolated and two rows of ribbon gut sutures are placed in position on either side of the contemplated line of division, the isthmus is divided between them, and the sutures are utilized to hold in place pieces of fat applied to the cut edges to control hemorrhage. After division of the isthmus the kidney on the side of the loin incision is pulled over laterally. If there is considerable hydronephrosis due to obstruction at the ureteropelvic junction, a small incision is made in the renal pelvis to determine if there is narrowing due to actual stricture. Through this a splinting catheter is introduced into the narrowed ureter. A Foley Y-plastic operation is done on the ureteropelvic junction if necessary. The pelvis is drained with a Malecot catheter and both catheters are brought out through a nephrostomy wound. The kidney then is fixed in position by a ribbon gut or Gerota fascia shelf nephropexy. If the patient's condition warrants, the other side may be operated upon at the same time, or, if deemed advisable, 10 to 14 days may be allowed to elapse before operation is done on the other side. Postoperatively, the splinting catheter and nephrostomy tube are left in place for 6 weeks. DAVID ROSENBLOOM, M.D.

New Growths of the Kidney and Ureter. E. W. RICHES, I. H. GRIFFITHS, and A. C. THACKRAY. *Brit. J. Urol.*, 1951, 23: 297.

The authors reviewed 2,314 cases of tumor of the kidney submitted by members of the British Association of Urological Surgeons working in 67 centers in the British Isles. This is one of the largest series ever presented and lends itself to a proper statistical analysis, especially in view of the 5 to 10 year follow-up which is given in most of the cases. The incidence of the various tur ors was as follows: adenocarcinoma in 75 per cent, transitional cell carcinoma in 7 per cent, squamous cell carcinoma in 2 to 5 per cent, simple papilloma in 3 per cent, Wilms' tumor in 8 per cent, primary tumor of the ureter in 0.9 per cent, and others in 1.9 per cent.

Males were affected twice as often as females and both sides of the body showed an equal incidence. There were 8 bilateral tumors, 7 of which were adenocarcinomas and 1 a Wilms' tumor.

Renal pain, hematuria, and swelling gave the first clue in most cases, either alone or in combination in every group, but the incidence varied with the type of the tumor. Thus, hematuria occurred in 62 per cent of the adenocarcinomas, in 90 per cent of the transitional papillary tumors, and 18 per cent of the Wilms' tumors.

In the Wilms' tumor the predominant feature was the tumor, first noticed either by the parents or the doctor. Silent cases occurred in all of the groups but

they were predominant in the squamous cell carcinomas and Wilms' tumors.

Renal pain was fairly frequent in each type, occurring in 50 per cent of the cases in every group except the Wilms' tumors in which it was noticed in 20 per cent of the group.

There were 69 cases of squamous cell carcinoma. Pain was more common and tumor less prevalent than in the other types. This may be due to the high incidence of stone (29%). The latter may also play an important part in the cause of the condition and hence stones should be removed whenever possible. The growth extended into the ureter in 7 (13%) of the 54 operable cases. Extension is by spread in continuity, unlike the disconnected growths often found in papillary carcinoma. The authors believe that chronic infection plays an important role in the causation of these tumors. The survival rates in this series for squamous cell carcinoma were as follows: 1 year in 33 per cent, 3 years in 13 per cent, and no survival for 5 years.

There were 74 cases of simple papilloma of the renal pelvis. Hematuria occurred in 87 per cent and it was the sole presenting feature in 44 per cent. In all cases of papillary tumors, investigation of the upper and lower urinary tracts is necessary. In all cases of papillary tumor of the bladder, the upper tract should be investigated.

Of 147 patients with operable tumors of the renal pelvis 46 per cent had involvement of the ureter, bladder, or both. No bilateral papillary tumors were recorded. If one is to believe that tumor formation is influenced by some noxious agent excreted in the urine, it is indeed surprising that ureteric involvement is always unilateral and on the side of the initial kidney lesion. The entire ureter and a cuff of the bladder should be removed in every case. One must guard against a spill.

Stump involvement following simple nephrectomy occurred as follows: simple papilloma of the pelvis in 8 per cent, transitional cell carcinoma in 9 per cent, and squamous cell carcinoma in 3.6 per cent.

In 79 cases in which nephroureterectomy was performed and in which no involvement of the ureter or bladder was demonstrated at the time of surgery the 1 year survivals amounted to 62 per cent and the 10-year survivals to 41 per cent.

The 5 and 10-year survivals were approximately equal (50%) in the 74 cases of simple papilloma of the renal pelvis (25% of all pelvic tumors).

There were 21 cases of primary tumor of the ureter. Of these 17 were malignant and 4 benign. Of the 17 malignant tumors, 15 were transitional cell carcinomas, 1 was a squamous cell carcinoma, and 1 a spindle cell sarcoma. Hematuria occurred in 86 per cent and loin pain in 33 per cent. The greatest incidence occurred in the seventh decade.

In cases of adenocarcinoma of the renal parenchyma, the authors have found histologic grading of the tumor to be of great value. They have formulated 3 grades of malignancy. In grade 1 tumors the 1, 3, 5, and 10-year survivals were 89, 82, 77, and 43 per cent, respectively, in grade 2 tumors they were 72, 43, 31, and 0 per cent, respectively, and in grade 3 tumors they were 48, 26, 8, and 0 per cent, respectively. In the case of transitional cell tumors, also, the survival depends upon the histologic grade of the tumor and vein involvement also greatly affects the prognosis. Without vein involvement the 3, 5, and 10-year survivals were 44, 30, and 17 per cent, respectively; with vein involvement they were 24, 19 and 4 per cent, respectively.

Weight loss is a bad prognostic sign. If the first symptoms are due to metastases the outlook is poor. Among the 56 recorded cases only 3 patients survived 1 year and none, 3 years. Twenty-eight per cent of the tumors in this series were inoperable. In 26 per cent the history ranged over 1 year. The reasons given for this high incidence of inoperability are (1) absence of early localizing signs, (2) failure in not taking the hematuria seriously, and (3) misdiagnosis.

There were 189 Wilms' tumors. There was no difference as to the sex or side involved. There was 1 known bilateral case. Half of the cases occurred between the ages of 2 and 4 years. There was tumor in 68 per cent and hematuria in 18 per cent. In 138 cases the therapy could be evaluated. The authors have come to the following conclusions:

1. Irradiation therapy is of no value as the sole method of treatment, but in conjunction with surgery it is invaluable.

2. Small tumors with no local extension indicate nephrectomy alone. If there is any evidence of incomplete removal, postoperative irradiation is indicated.

3. In the case of large, originally inoperable tumors, preoperative irradiation should be given for 3 weeks, after which nephrectomy should be performed. Then postoperative irradiation should be given to the tumor bed, both renal veins, and the regional nodes on both sides.

4. Localized metastases in the bones are no contraindication to nephrectomy, but when pulmonary metastases occur the case should be considered inoperable.

The intravenous urogram is important because it may indicate whether the kidney is functioning or not. If it is not functioning this may be due to involvement of the vein, destruction of the kidney by tumor, or to a blood clot. In any of these events the prognosis is adversely affected.

The greatest value of perirenal air insufflation lies in the fact that an assessment of the inoperability of the tumor can be made from the local fixity which it reveals.

The main characteristic of the pyelogram in primary tumors of the ureter is the irregularity of the filling defect with dilatation above. Tumors of the upper third are most easily demonstrated. The greatest difficulty occurs in tumors of the lower third. Often the catheter cannot be passed far enough to permit the ureterogram to be made. If it does pass the growth, the picture will not always show the

lower end of the ureter. Tumors of the lower ureter are sometimes palpable bimanually, and occasionally a piece for biopsy may be obtained cystoscopically.

The authors condemn the radical exposures now advocated for the removal of renal tumors. They believe that the retroperitoneal approach is less traumatizing and that it is usually adequate for exposure.

In this series the lumbar approach was used in 940 cases with an operative mortality of 4 per cent and the transperitoneal approach, in 167 cases with an operative mortality of 5 per cent. When the vein was not involved the operative mortality was 3 per cent and when it was involved (225 cases) the operative mortality was 13 per cent. Twelve deaths occurred after exploration alone.

FREDERICK A. LLOYD, M.D.

A New Concept of the Etiology of Megaloureters. ORVAR SWENSON, H. EDWARD MACMAHON, WILLIAM E. JACQUES, and JAMES S. CAMPBELL. *N. England J. M.*, 1952, 246: 41.

From the study of 7 bladders obtained at autopsy and the review of 4 clinical cases, the authors have formulated a new concept of the etiology of megaloureters.

Because of a faulty parasympathetic innervation, these patients had poor detrusor function which revealed itself clinically by infrequency of voiding and incomplete emptying of the bladder. Cystometrograms revealed an absence of emptying contractions and a gradual rise of intravesical pressure. For some time between urinations the kidneys secrete in the face of an abnormal intravesical pressure and this is a large factor in producing megaloureters and hydronephrosis. Another important factor is the presence of a large urinary residue and the resulting urinary infection which augments the enlargement and poor function of the upper urinary tract. Faulty relaxation of the sphincter mechanism by a defective parasympathetic mechanism in preparation for and during urination might contribute to the formation of megalobladder and megaloureter. In many ways these bladders are similar to cord bladders.

An ideal method for the correction of megalobladder and megaloureter has not been found. Prolonged suprapubic drainage is efficient but inconvenient for the patient and his family. After 4 to 6 months of drainage the bladder function is improved and the patients completely empty their bladders. It is important to teach them to empty their bladders at least four times a day and to use manual suprapubic pressure to ensure complete emptying. Some patients, however, gradually develop more residue, which will probably again decompensate their bladders. Nevertheless, this method of treatment is far superior to any other method presently in use.

In the cases under discussion there was no mechanical obstruction that might account for the dilatation. FREDERICK A. LLOYD, M.D.

The Management of Ureteral Injuries. JOHN F. PATTON. *J. Urol.*, Balt., 1952, 67: 852.

Many ureteral injuries in both war and civilian practice remain undetected. Reports in the literature of fewer than 100 war and less than 1,000 civilian ureteral injuries do not reflect the true incidence. The primary consideration in all instances should be the preservation of the kidney with ultimate restoration of the continuity of the urinary tract to as nearly the normal state as possible with first consideration of the individual's life as a whole.

In war injuries, because of severe abdominal wounds, injuries to the ureter become of secondary importance and are overlooked. Recognition, unfortunately, usually occurs only after a urinary fistula has developed. Such was the case in 18 of 25 war injuries reported by Robinson, the fistula developing within the first 10 days.

In civilian practice the most common cause of injury to the ureter is a surgical accident, most frequently sustained during surgery in the female pelvis. These injuries may be unilateral or bilateral and may occur from (1) ligation, (2) crushing with the forceps, (3) distortion due to closely approximated sutures, (4) incision or partial division, (5) complete division, or (6) resection of a portion of the ureter. The principles of management are early recognition, adequate drainage for the prevention or, in the presence of extravasation, diversion of the urinary stream above the point of injury for protection of the kidney, and repair of the defect.

In restoring the continuity of the urinary tract, re-anastomosis of the ureter or re-implantation into the bladder are the methods of choice. Ligation of the ureter with the purpose of producing hydronephrotic atrophy of the kidney is to be condemned except under most urgent circumstances. Extensive loss of the ureter, while rare, may necessitate consideration of such procedures as ureterointestinal anastomosis, cutaneous ureterostomy, or transureteroureteral anastomosis. Attempts at correction of the injury during early postoperative periods, particularly deligation procedures, may be difficult or even hazardous, and, if infection has intervened, would seem contraindicated. In such cases a temporary nephrostomy or ureterostomy is the safest course.

In performing ureteral anastomosis there is usually difficulty in isolating the distal segment. This can be accomplished by careful dissection aided by the passage of a large-calibered ureteral catheter from the bladder side. Successful re-union of the ureter depends on careful approximation without tension, preservation of the blood supply, adequate splinting (preferably with polyethylene tubing), and the control of infection. A question is raised as to the advisability of postoperative dilatation in well performed operations on the basis that added trauma may increase fibrosis.

If the distal segment of the ureter is not of sufficient length to permit re-anastomosis, re-implantation of the proximal ureter into the bladder is the

method of choice. The preferred site is the base or fixed portion of the bladder. Many techniques have been proposed. The author presents a method for re-implantation through the normal intramural bed. The bladder is opened and a small sound is passed through the ureteral orifice and forced through the strictured area. The proximal ureter is grasped by forceps passed through this passageway and drawn to the bladder for attachment by flaps, to reconstruct a more normal anatomical relationship.

Several case reports illustrating the principles discussed are presented. ALLAN K. SWERSIE, M.D.

Physiology of the Transitional Epithelium of the Urinary Tract. Vesical Secretion in the Dog. JOSE DE J. ALVAREZ-IERENA. *J. Urol.*, Balt., 1952, 67: 939.

The author's thesis deals with the question as to whether the transitional epithelium of the bladder serves not merely as a lining to the excretory passage but also has secretory and absorptive powers.

The problem of absorption by vesical epithelium has been repeatedly studied by research workers. Evidence has been presented of absorption of substances of miscellaneous nature, such as poisons, stimulating agents of the autonomous nervous system, local anesthetic agents, and organic dyes. More experimental work indicated that water, urea, and chlorides are reabsorbed from the bladder if no emptying of its contents is permitted. The magnitude and speed of reabsorption depend upon three factors: (1) the molecular size of the substance (dissociable inorganic salts in ionic dispersion absorb faster than proteins and lipids in colloidal states, (2) more highly concentrated substances absorb faster as in any dialysis experiment, (3) the status of the vesical epithelium (there is a higher absorption ratio of urea solutions shown in trigonitis and cystitis than exists in the normal bladder).

Tracings of the spread of instillations of India ink into the bladder show the routes of absorption to be both lymphatic and vascular. There are three main capillary networks of the blood vessels in proximity to the vesical epithelium. One lies beneath the basal layer of cells, one between the mucosa and the submucosa, and one in the submucosa. Lymph vessels are found in the mucosa and submucosa.

The rich distribution of blood and lymph networks in the basal area of the bladder and the presence of glandlike structures in the trigonal area suggest the likelihood of vesical secretory powers. Studies in this field have been incomplete. In an experiment designed to avoid artificial conditions, such as instillations of solutions into the bladder and manipulation or trauma to the mucosa, the author makes observations on the isolated bladders of 9 dogs. The organs possessed intact blood, lymph, and nerve supplies, but were operatively disconnected from the upper and lower urinary tract. Operative details are presented.

At intervals varying from 22 to 70 days after vesical isolation, the abdomen was explored under ether anesthesia and the distended bladder punctured with a needle and aspirated. Two bladders had become infected. The amount of vesical secretion and chemical and cytological data varied according to the presence or absence of infection. The fluid in the infected organs amounted to 22 ml. and 63 ml., and in appearance was purulent and homogeneous. In the noninfected bladder the fluid contents ranged from 3 to 6 ml. for the light-brown fluid and from 10 to 16 ml. for the chocolate-colored fluid.

Further analysis showed that the vesical secretion contains proteins, chlorides, total and nonprotein nitrogen, acid and alkaline phosphatase, and, in one case, glucose. These are chemical components of normal plasma found in similar amounts in the secretion, except for a slight elevation of the acid phosphatase and nonprotein nitrogen. Normal erythrocytes oxidized by normal vesical epithelium sometimes gave a chocolate color to the secretion.

The mechanism of vesical secretion is explained by the combined activities of diffusion, dialysis, transudation, and diapedesis, and is attributed to the rich vascular and lymphatic supply of the normal vesical epithelium. ALLAN K. SWERSIE, M.D.

The Problem of the Nonopaque Urinary-Tract Stone. S. RICHARD MUELLNER and BERNARD SEARS. *J. Urol.*, Balt., 1952, 67: 832.

Four brief case summaries are cited to illustrate the problems which may arise because of nonopaque calculi. The author's chief concerns have been to know when to suspect a nonopaque stone and how best to identify it.

From their study of 24 cases they conclude that most of the nonopaque calculi are composed of uric acid, occur singly, are small, seldom lead to severe renal damage, and can be treated by conservative methods. There is said to be no infallible method for the recognition of such stones, but they should be suspected when any patient with pain, hematuria, and negative roentgenograms has a blood uric acid of 5 or more mgm. per cent.

ORMOND S. CULP, M.D.

BLADDER, URETHRA, AND PENIS

Trigonal Cystectomy (La cystectomie trigonale). R. COUVELAIRE. *J. Urol. Méd.*, Par., 1952, 57: 658.

Couvelaire describes an operation that he calls a "trigonal cystectomy." This operation, which has been performed ten times, consists of: (1) the removal of the three vesical orifices, i.e., both ureteral orifices and the vesical end of the urethra; (2) the dissection and removal of the lymph tissues of the pelvis in the male; (3) the conversion of the bladder dome into a functional bladder and reimplantation of the ureters into the remaining portion of the bladder; (4) the preservation of the natural flow of urine through the bladder, made from the remaining bladder dome by a process of "trocarization" through the intact urethra in the male and a re-

constructed urethra in the female. The dome of the bladder adapts itself to the function and capacity of the normal bladder.

In the male, the usual incision, extending from the umbilicus to the pelvis, is made. The lateral sides of the bladder are dissected from the peritoneum and ligature of the differential pedicle is made. A small opening is made into the peritoneal cavity to determine if there is involvement of the dome of the bladder. In the absence of any involvement, the opening is closed and the operation is carried forward. When the extent of the lesion has been determined, and it is decided that this operative procedure is the method to be used, the next step is to free the sides of the bladder from the surrounding tissue. The external iliac vessels are next identified and dissected free from fatty and lymphatic tissue, the obturator nerve is located and dissected from the surrounding tissue, and the levator muscles are then cleaned of extraneous tissue.

The exposure of the iliac vessels naturally uncovers the hypogastric vessels and the ureters. The umbilical trunks of the vessels are next identified and carefully preserved. The ureters are sectioned close to the bladder and secured with a suture in order to retract them out of the operative field, and also to establish a means of easily identifying them later in the operation.

The assistant places a finger into the rectum to elevate the prostate and facilitate its dissection. When the prostate has been freed from the surrounding tissue, it is bisected, leaving the anterior portion attached to the urethra. Hemostasis is obtained by closing the vesicle part of the prostate with strong sutures that can be used for traction in completing the subsequent removal of the bladder. The urethral portion of the prostate is also secured by four linen sutures, one anterior, one posterior, and two lateral. The block dissection of the prostate, seminal vesicles, and trigone is continued. The rectum and the pouch of Douglas is identified, and caution must be used so as not to inadvertently make an opening into the bowel. The trigonal portion of the bladder is elevated as it is freed from the surrounding tissue, until that portion that is to be removed has been entirely dissected free. This portion is removed from the dome of the bladder. The dome of the bladder is then brought down to the remaining portion of the prostate and fixed into position by the four stay sutures that previously had been placed when the prostate was bisected.

The ureters are transplanted into the dome of the bladder, and catheters are placed through the new ureterovesical orifices and brought out through the cut end of the bladder dome. The remaining portion of the bladder is then brought together around the catheters placed through the ureters and a No. 20 Malecot catheter, and closed in two layers. The catheters are fixed to the skin and the rest of the skin is closed in a routine manner. The completed procedure is pictured in Fig. 1. The drainage of urine through the catheters is maintained for 20 days.

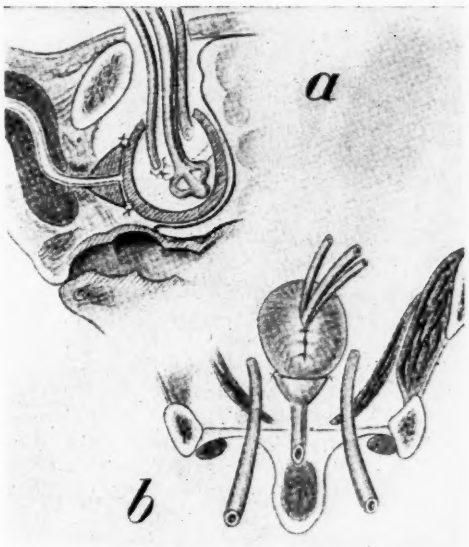

Fig. 1 (Couvelaire).

"Trocarization" through the urethra is done by introducing a Janet sound through the urethra into the bladder. A catheter is placed through the urethra for 12 days, then the ureteral catheter and the cystotomy tube are removed and the cystotomy fistula is allowed to heal.

Trigonal cystectomy in the female is described by the author as a urethrotrigonectomy. The operation is performed by way of the vagina and the perineum. The technique is described as follows:

The incision is made approximately 3 cm. below the urethral meatus, leading from one of the lateral margins to the other, and separating the vagina into two segments. The anterior segmental portion of the incision forms an arc surrounding the urethra as high as the clitoris and including the urethra. The two ends of the incision join the original transverse incision. The roof of the urethra is dissected from the surrounding tissue and freed from the attachment to the symphysis pubis. By cutting the puboprostatic ligament, the space of Retzius is entered and the venous oozing is controlled by a pack. With the curved scissors the inferior surface of the trigone is then dissected and gradually exposed. This procedure is done without opening the peritoneal cul-de-sac. A Young's retractor is placed through the urethra, and by continued dissection the bladder is gradually freed from the surrounding structures. When the bladder has been sufficiently mobilized, the vesical cavity is opened, and the ureters are identified and carefully dissected from the bladder. They are then sectioned, and an effort is made to preserve as much of their length as

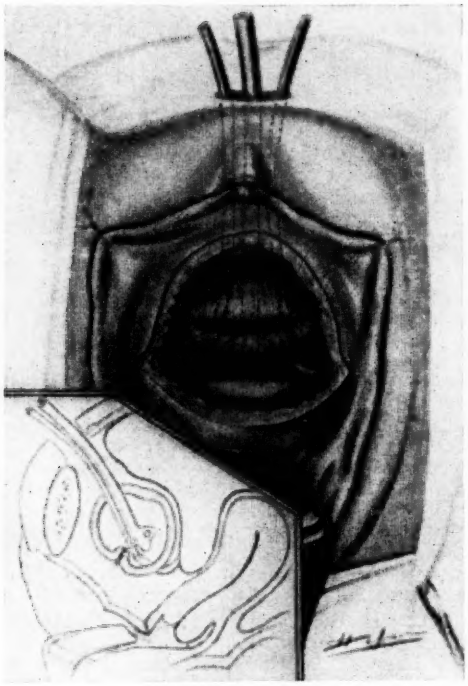

Fig. 2 (Couvelaire).

possible. The cut ends of the ureters are bivalved and two long catgut sutures are placed for later identification and transplantation. The trigonal cuff of the bladder and the urethra are circumcised from the dome of the bladder, and the ureters are then transplanted into the remaining portion of the bladder, i.e., the dome. A counter-incision is made with a curved forceps faced upward to emerge just above the symphysis pubis, and this represents the egress of the two ureteral splinting catheters and the Malecot cystotomy tube. The dome of the bladder is closed in three layers, the first two of catgut and the third layer of linen. A cystotomy incision is made for the ureteral catheter splint and the cystotomy tube. Figure 2 shows the vesicle operation when completed.

After the completion of the formation of the bladder, a new urethra must be made. Twenty days after operation "trocarization" is done in order to provide for an opening into the bladder through the new urethra. This is done by a small caliber trocar guided by a finger through the cystotomy incision. A No. 14 Malecot catheter is left in place; the ureteral catheters and the cystotomy tube are removed. The catheter through the new urethra is left in place until the cystotomy is healed. The patient's ability to retain urine following the removal of the urethral catheter is not known until a trial is made. If the patient is not continent, Couvelaire constructs a tendinous sling that supports and angulates the new urethra and is fastened to the skin of the suprapubic region.

Trigonal cystectomy does not take the place of total cystectomy, but the author believes that it may have a certain field of usefulness in certain situations. For instance, in man, after estrogenic therapy for prostatic cancer involving the trigone and the seminal vesicles, and after irradiation of vesicle tumors where sclerosis of the vesicle orifice has taken place and the upper urinary tract must be protected. In the female, the operation has a field of usefulness for malignant tumors of the urethra and for patients with secondary radionecrosis from irradiation of cancer of the cervix where the dome of the bladder is not involved and the ureters are the site of progressive obstruction.

Couvelaire reported his results in 5 patients—4 men and 1 woman—who had this operation, with detailed descriptions of the final results in these cases. There was 1 operative death and 1 death 13 months after operation from hepatic and peritoneal metastases. One patient survived 4 years; another patient survived 14 months. The final case was that of a 68 year old woman with a tumor of the vaginal vault. This operation was done in January, 1951. In spite of ulceration of the tendon sling, the patient was able to control her urine quite well during the day but not so well at night.

CONRAD A. KUEHN, M.D.

Method of Retrograde Passing of a Probe in Impermeable Posttraumatic Strictures of the Urethra (Die retrograde Durchzugsmethode bei impermeablen posttraumatischen Strikturen der Harnroehre). H. HENNINGER. *Wien. med. Wschr.*, 1952, 2: 218.

The author discusses a series of 21 impermeable strictures of the posterior urethra following war injuries. In all cases the urine was drained by a suprapubic fistula, the urethra was completely torn, and partial or total defects, several centimeters in length, were present. Repeated attempts with the thinnest filiform bougie were unsuccessful. The following method was used to join the stump of the urethra with the bladder.

After suprapubic opening of the bladder, the tip of the left index is introduced in the internal orifice; then a notched metal probe is introduced from the urethra, and, under guidance of the left index, it is forced through the stricture into the bladder. A rubber tube is now pulled over the tip of the probe and tied to the notch by a silk thread. The metal probe is then retracted via the operative wound in the bladder, and the rubber tube is established as a bougie without end, through bladder, stricture, and urethra. After a period of 2 weeks the suprapubic drain is removed, and the urine is drained through the tube in the urethra.

WERNER M. SOLMITZ, M.D.

The Operative Treatment of Urethral Strictures (Ueber die operative Behandlung von Harnroehrenstrikturen). H. GROH. *Chirurg*, 1952, 3: 119.

This author has been working in Albert Schweitzer's hospital, the Urwaldspital, at Lambarène, French Equatorial Africa. Among the natives, gonorrhea is more prevalent than it is in either Europe or America, and is untreated; the result has been the development of strictures of the urethra and scrotal elephantiasis with multiple fistulas. The native will not seek medical aid until life becomes intolerable; then, emaciated, highly febrile, with dilated bladder, and with signs of severe infection and intoxication, the patient trudges for days and weeks to reach the hospital.

The author has now operated (by his method) on 18 patients with this type of advanced urethral stricture. The time is too recent for the assessment of ultimate results; however, the method is not basically different from that described by Sabadini in his text, "Chirurgie de l'urétre," published in Algiers, in 1950, in which he reports satisfying permanent results in 250 urethral strictures, 60 perineal phlegmons, and 100 urethral ruptures.

The chief characteristics which distinguish the author's method from that of Sabadini are the radical cleaning out of the cicatricial callus and the ruthless resection of the total involved urethral section, the resection sometimes involving a stretch of urethra of more than 10 cm.

A suprapubic fistula is first produced and a permanent catheter is inserted. After the infection and intoxication have sufficiently subsided, especially that due to kidney involvement, the patient is placed in the lithotomy position, and, under lumbar anesthesia, the fistulous tracts, skin, and all cicatricial tissues are excised down to the urethra, or the urethra in the involved section is removed en masse together with the cicatricial masses of perineal cicatricial tissue. The limits of the uninvolved portions of the urethra are demonstrated by means of metallic sounds introduced from the urethra and bladder.

When the region has been surgically cleansed, no attempt is made to mobilize the urethral stumps, nor to unite the two stumps by suture, except in rare instances in which the urethral defect measures less than 2 cm. A rubber tube of at least 22 Charrière caliber is introduced into the external urethral orifice, passed through to the operative defect, is then threaded into the proximal urethral stump and passed through the cavity of the bladder, and out through the cystotomy wound. This the author designates as an endless rubber sound; its purpose is to serve as a sort of internal splint around which the granulation processes can form a new urethral tube. The eventual epithelization of this new-formed tube requires from 2 to 3 months, after which time the endless tube is removed, if all fistulas have closed. During this period a permanent (Pesser) catheter is also introduced into the bladder from the cystotomy opening to provide egress for the urine and for bladder washings.

Sulfonamides and penicillin are administered during the first postoperative week.

Finally, the author discusses the difference in the processes of epithelization of the average defect, such as burns, in which the retraction of scar tissue tends to draw the edges of the wound apart, and of the endothelization of the newly formed urethral tube section, in which the retraction of the surrounding cicatricial tissue tends to bring the wound edges, or surfaces, together. JOHN W. BRENNAN, M.D.

The Present Treatment of Diffuse Periurethral Phlegmon (Traitement actuel du phlegmon diffus peri-urétral). By J. DUCASSOU (ALGER). *Lyon chir.*, 1952, 47: 322.

In the present article, Ducassou reports his method of treatment of 8 patients with diffuse perineal phlegmon during the course of a year and a half, at the Urological Clinic in Algeria. This type of lesion is frequently observed in North Africa, so that the cases reported do not represent the total number seen during this period, but, rather, those that illustrate his method of treatment.

A diffuse perineal phlegmon, as it is encountered in Algeria, is a difficult and dangerous condition to treat. In spite of the use of antibiotics, even though they are given early in the course of the disease and in large doses, extensive surgical procedures also are necessary to effect a cure.

These patients are given the benefit of laboratory examinations. The most useful examination is that of an immediate cystourethrogram, which can be made without hesitation or fear of any untoward complications. A cystourethrogram is valuable as a means of showing the site and extent of the lesion in the urethra, by the collection and diffusion of the contrast media into the periurethral tissues. This type of x-ray picture also shows the strictured area. In this way the best surgical approach to the lesion is demonstrated. Incidentally, the author obtains urethrograms after convalescence, to demonstrate the patency of the urethra following his method of treatment.

The many small fistulous tracts in the perineum are also demonstrated by this x-ray examination. With the exact knowledge of the location and extent of the perineal lesion, as well as the size and conformation of the urethral stricture provided by the urethrogram, definitive surgical treatment can be applied not only to the phlegmon but to the urethral stricture as well.

The use of antibiotics has extended the margin of safety to the patient.

The author's method of surgical treatment is to do a preliminary cystotomy. Then, guided by the information obtained from the urethrograms, the perineum is opened and a complete removal of the necrotic tissue is accomplished. The fistulous tracts are carefully opened and dissected to normal tissue. The strictured area in the urethra is also removed. When the necrotic tissue has been completely removed, a splinting tube is placed through the

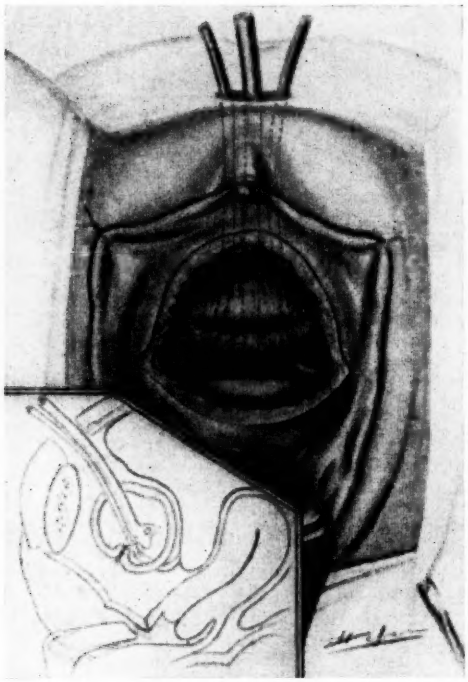

Fig. 2 (Couvelaire).

possible. The cut ends of the ureters are bivalved and two long catgut sutures are placed for later identification and transplantation. The trigonal cuff of the bladder and the urethra are circumcised from the dome of the bladder, and the ureters are then transplanted into the remaining portion of the bladder, i.e., the dome. A counter-incision is made with a curved forceps faced upward to emerge just above the symphysis pubis, and this represents the egress of the two ureteral splinting catheters and the Malecot cystotomy tube. The dome of the bladder is closed in three layers, the first two of catgut and the third layer of linen. A cystotomy incision is made for the ureteral catheter splint and the cystotomy tube. Figure 2 shows the vesicle operation when completed.

After the completion of the formation of the bladder, a new urethra must be made. Twenty days after operation "trocarization" is done in order to provide for an opening into the bladder through the new urethra. This is done by a small caliber trocar guided by a finger through the cystotomy incision. A No. 14 Malecot catheter is left in place; the ureteral catheters and the cystotomy tube are removed. The catheter through the new urethra is left in place until the cystotomy is healed. The patient's ability to retain urine following the removal of the urethral catheter is not known until a trial is made. If the patient is not continent, Couvelaire constructs a tendinous sling that supports and angulates the new urethra and is fastened to the skin of the suprapubic region.

Trigonal cystectomy does not take the place of total cystectomy, but the author believes that it may have a certain field of usefulness in certain situations. For instance, in man, after estrogenic therapy for prostatic cancer involving the trigone and the seminal vesicles, and after irradiation of vesicle tumors where sclerosis of the vesicle orifice has taken place and the upper urinary tract must be protected. In the female, the operation has a field of usefulness for malignant tumors of the urethra and for patients with secondary radionecrosis from irradiation of cancer of the cervix where the dome of the bladder is not involved and the ureters are the site of progressive obstruction.

Couvelaire reported his results in 5 patients—4 men and 1 woman—who had this operation, with detailed descriptions of the final results in these cases. There was 1 operative death and 1 death 13 months after operation from hepatic and peritoneal metastases. One patient survived 4 years; another patient survived 14 months. The final case was that of a 68 year old woman with a tumor of the vaginal vault. This operation was done in January, 1951. In spite of ulceration of the tendon sling, the patient was able to control her urine quite well during the day but not so well at night.

CONRAD A. KUEHN, M.D.

Method of Retrograde Passing of a Probe in Impermeable Posttraumatic Strictures of the Urethra (Die retrograde Durchzugsmethode bei impermeablen posttraumatischen Strikturen der Harnroehre). H. HENNINGER. *Wien. med. Wschr.*, 1952, 2: 218.

The author discusses a series of 21 impermeable strictures of the posterior urethra following war injuries. In all cases the urine was drained by a suprapubic fistula, the urethra was completely torn, and partial or total defects, several centimeters in length, were present. Repeated attempts with the thinnest filiform bougie were unsuccessful. The following method was used to join the stump of the urethra with the bladder.

After suprapubic opening of the bladder, the tip of the left index is introduced in the internal orifice; then a notched metal probe is introduced from the urethra, and, under guidance of the left index, it is forced through the stricture into the bladder. A rubber tube is now pulled over the tip of the probe and tied to the notch by a silk thread. The metal probe is then retracted via the operative wound in the bladder, and the rubber tube is established as a bougie without end, through bladder, stricture, and urethra. After a period of 2 weeks the suprapubic drain is removed, and the urine is drained through the tube in the urethra.

WERNER M. SOLMITZ, M.D.

The Operative Treatment of Urethral Strictures (Ueber die operative Behandlung von Harnroehrenstrikturen). H. GROH. *Chirurg*, 1952, 3: 119.

This author has been working in Albert Schweitzer's hospital, the Urwaldspital, at Lambarêne, French Equatorial Africa. Among the natives, gonorrhea is more prevalent than it is in either Europe or America, and is untreated; the result has been the development of strictures of the urethra and scrotal elephantiasis with multiple fistulas. The native will not seek medical aid until life becomes intolerable; then, emaciated, highly febrile, with dilated bladder, and with signs of severe infection and intoxication, the patient trudges for days and weeks to reach the hospital.

The author has now operated (by his method) on 18 patients with this type of advanced urethral stricture. The time is too recent for the assessment of ultimate results; however, the method is not basically different from that described by Sabadini in his text, "Chirurgie de l'urétre," published in Algiers, in 1950, in which he reports satisfying permanent results in 250 urethral strictures, 60 perineal phlegmons, and 100 urethral ruptures.

The chief characteristics which distinguish the author's method from that of Sabadini are the radical cleaning out of the cicatricial callus and the ruthless resection of the total involved urethral section, the resection sometimes involving a stretch of urethra of more than 10 cm.

A suprapubic fistula is first produced and a permanent catheter is inserted. After the infection and intoxication have sufficiently subsided, especially that due to kidney involvement, the patient is placed in the lithotomy position, and, under lumbar anesthesia, the fistulous tracts, skin, and all cicatricial tissues are excised down to the urethra, or the urethra in the involved section is removed en masse together with the cicatricial masses of perineal cicatricial tissue. The limits of the uninvolved portions of the urethra are demonstrated by means of metallic sounds introduced from the urethra and bladder.

When the region has been surgically cleansed, no attempt is made to mobilize the urethral stumps, nor to unite the two stumps by suture, except in rare instances in which the urethral defect measures less than 2 cm. A rubber tube of at least 22 Charrière caliber is introduced into the external urethral orifice, passed through to the operative defect, is then threaded into the proximal urethral stump and passed through the cavity of the bladder, and out through the cystotomy wound. This the author designates as an endless rubber sound; its purpose is to serve as a sort of internal splint around which the granulation processes can form a new urethral tube. The eventual epithelization of this new-formed tube requires from 2 to 3 months, after which time the endless tube is removed, if all fistulas have closed. During this period a permanent (Pesser) catheter is also introduced into the bladder from the cystotomy opening to provide egress for the urine and for bladder washings.

Sulfonamides and penicillin are administered during the first postoperative week.

Finally, the author discusses the difference in the processes of epithelization of the average defect, such as burns, in which the retraction of scar tissue tends to draw the edges of the wound apart, and of the endothelization of the newly formed urethral tube section, in which the retraction of the surrounding cicatricial tissue tends to bring the wound edges, or surfaces, together. JOHN W. BRENNAN, M.D.

The Present Treatment of Diffuse Periurethral Phlegmon (Traitement actuel du phlegmon diffus peri-urétral). By J. DUCASSOU (ALGER). *Lyon chir.*, 1952, 47: 322.

In the present article, Ducassou reports his method of treatment of 8 patients with diffuse perineal phlegmon during the course of a year and a half, at the Urological Clinic in Algeria. This type of lesion is frequently observed in North Africa, so that the cases reported do not represent the total number seen during this period, but, rather, those that illustrate his method of treatment.

A diffuse perineal phlegmon, as it is encountered in Algeria, is a difficult and dangerous condition to treat. In spite of the use of antibiotics, even though they are given early in the course of the disease and in large doses, extensive surgical procedures also are necessary to effect a cure.

These patients are given the benefit of laboratory examinations. The most useful examination is that of an immediate cystourethrogram, which can be made without hesitation or fear of any untoward complications. A cystourethrogram is valuable as a means of showing the site and extent of the lesion in the urethra, by the collection and diffusion of the contrast media into the periurethral tissues. This type of x-ray picture also shows the strictured area. In this way the best surgical approach to the lesion is demonstrated. Incidentally, the author obtains urethrograms after convalescence, to demonstrate the patency of the urethra following his method of treatment.

The many small fistulous tracts in the perineum are also demonstrated by this x-ray examination. With the exact knowledge of the location and extent of the perineal lesion, as well as the size and conformation of the urethral stricture provided by the urethrogram, definitive surgical treatment can be applied not only to the phlegmon but to the urethral stricture as well.

The use of antibiotics has extended the margin of safety to the patient.

The author's method of surgical treatment is to do a preliminary cystotomy. Then, guided by the information obtained from the urethrograms, the perineum is opened and a complete removal of the necrotic tissue is accomplished. The fistulous tracts are carefully opened and dissected to normal tissue. The strictured area in the urethra is also removed. When the necrotic tissue has been completely removed, a splinting tube is placed through the

urethra. The splinting tube is left in the urethra until urethral healing is apparently complete. This usually takes place about the fiftieth day; then the urethral tube and the cystotomy tube is removed and a retention catheter is placed through the urethra. The cystotomy is allowed to close. A final urethrogram is made to determine if the urethra is adequate, and if it is completely healed.

Occasionally, there may be a small perineal fistula that can be readily closed by a plastic repair.

This procedure is used by the author in most of his cases, but if the perineal phlegmon has extended to the pelvis or to the hypogastric region, the operation may have to be modified; however, the same general technique is followed.

CONRAD A. KUEHN, M.D.

GENITAL ORGANS

Cancer of the Prostate (Cancer de prostata). ADOLFO FORT. *An. cirug.*, Rosario, 1951, 16: 213.

An experience of 8 years with 37 prostatic cancers has given the author some idea of what to expect of hormone therapy. His opinions coincide largely with those of American and French authors who have been working in this field. The dosage of estrogen has been as high as 20 to 30 mgm. daily; on the whole, however, the dose has been adjusted empirically, being of an amount to render the breast sensitive without its being painful. However, there has always appeared to be the phase wherein the effect of the estrogen was lost, the patient succumbing to cachexia. The pagetoid lesions with diffuse roentgenologic image regressed, as a rule, while the true metastases with localized, sharply defined borders were unaffected. Thus, the author concludes that hormone therapy is of value in procuring immediate alleviation of pain, and in improving the condition in some patients to the point where operation may be considered, but he believes that at present the only hope of permanent cure lies in surgery.

Incidentally, the author warns against the indiscriminate use of androgens for prostatism; in fact, one of the patients among the cases here reported had originally undergone treatment with androgens for the symptoms of prostatism, with disastrous consequences.

There have been no 5 year survivals among the author's 37 cases of prostatic cancer. The difficulty has been to get these patients early enough for a prospect of successful surgery. The author has been practicing transrectal prostatic biopsies, using the Maraini trocar as modified by Astraldi. Recently he has become greatly interested in the Millin retropubic method of removing the seminal vesicles together with the prostatic tumor itself. He has been familiarizing himself with the technique of the operation on patients with prostatic adenoma (50 Millin prostatectomies) and has recently started to use the technique for removal of the cancerous prostate and seminal vesicles. He reports, in detail, 3 operations of this type, all of which were successfully accomplished. One of these 3 patients died a year and 2 months later of bone and pulmonary metastases; another died the night following the operation, of infarct of the posterior aspect of the myocardium; the remaining patient is still living and well a year and 1 month after the operation. The last mentioned patient will undoubtedly be reported upon fully at a later date. The author has been making some minor changes in the Millin operation and hopes to report on these changes in a subsequent publication.

JOHN W. BRENNAN, M.D.

Treatment of Ectopia of the Testicle; Results Observed in 132 Patients (Tratamiento de la ectopia testicular; resultados observados in 132 enfermos). JUNA ZAÑARTU and EDWIN C. HAMBLEN. *Rev. méd. Chile*, 1952, 80: 79.

Of the total of 132 patients forming this material, 31, all of whom were over 20 years of age, had not received any treatment whatever, 59 were treated surgically (orchiopexy or castration) and 28 were treated with either androgens or chorionic gonadotropins. A few patients received the combined therapy of hormones and surgery.

Among the 31 nontreated patients, 17 were instances of bilateral, and 14, unilateral cryptorchism. In 12 of the former (70.5%) and in 3 of the latter (21.4%), signs of androgenic deficiency were observed. In all instances, bilateral and unilateral, the testicle was atrophic (less than 2 cm. in diameter), and in all the patients with bilateral cryptorchism there was azoospermia. The laboratory findings (17-ketosteroids in urine and urinary gonadotropic activity) were somewhat divergent but were consistent, as a rule, in the individual instance; that is, in the clinical signs of absence of hypoandrogenism, the former would be normal in amount, and the latter would be increased.

Among the 59 surgically treated patients, the results with reference to fertility could later be checked in 37. In general it was found that the results were noticeably better when the operation could be done before the patient had reached the age of 10 years. The authors consider the best time for operation to be from the third to the sixth years of age.

Of the 28 patients treated with hormones, 3 were given testosterone, and satisfactory improvement was obtained so far as the symptoms of hypoandrogenism are concerned; however, all these patients, when checked later, were found to be azoospermic. Although no large dosages of this hormone were administered, the preparation was abandoned, and the chorionic gonadotropins were substituted. Nevertheless, the authors believe that the androgens are deserving of a more extensive trial. Here again it was found that the results of chorionic gonadotropic therapy were better when the therapy was administered before the patient had reached the age of 10. The authors regard the optimum period for this form of therapy to be from the third to the eighth year.

On the whole, hormone therapy, with the use of gonadotropins in sufficient amounts and requiring a

pure preparation, produces results superior to those obtained by orchiopexy; however, the best results are had by a combination of the two methods. Subsequent hormonal therapy is capable of partial or total correction of the effects of surgical orchiopexy, i.e., if the testicular blood supply has not been injured by the operation.

The authors recommend that a sufficient trial be given to hormone treatment of the cryptorchic patient, and where it fails to produce results, the failure of descent should be ascribed to a mechanical obstruction of some sort and, if possible, the testicle should be brought down and fixed surgically, or removed by castration if it cannot be so lowered and fixed in the scrotum. Of course, hormone therapy should also follow the operation where indicated.

The dose of chorionic gonadotropin varies according to the age of the patient; too large doses may result in precocious puberty. This can be avoided by watching the patient and suspending the treatment when necessary. JOHN W. BRENNAN, M.D.

Testicular Tumors. OLE J. JENSEN, JR. *J. Am. M. Ass.*, 1952, 149: 109.

Testicular tumors account for 3 per cent of the malignant lesions of the genitourinary tract in males. They occur most frequently between the ages of 18 and 40 years, are noted on the right side a little more often than on the left, and conform to a variety of histologic patterns which are summarized briefly.

Special emphasis is given to errors in diagnosis, and early orchiectomy is urged for all suspicious lesions. High ligation of the cord at the level of the abdominal cavity is advised, and 5 cases are reported in abstract to illustrate significant features of these tumors.

One patient, 27 years of age, died with pulmonary metastases following orchiectomy and postoperative radiation for an embryonal carcinoma. Another had a nodule between the testis and the epididymis which proved to be a mixed teratoma and adenocarcinoma, and had been reported as well 3 years after orchiectomy alone.

The third tumor occurred in an atrophic testis and was a seminoma. Deep x-ray therapy was also employed but no mention is made of the ultimate result. The fourth case proved to be a hemorrhagic infarction rather than a tumor. The last case in this personal series was a benign epidermoid cyst and is the third such case on record.

ORMOND S. CULP, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Lipoidosis of the Tendons (Experimentelle Beitraege zur Frage der Tendolipoidose). J. Borsay, J. Csipak, and G. Dettre. *Zschr. Orthop.*, 1952, 81: 545.

It has been known that in the natural process of aging, lipoids are deposited in the tendons. The experiments carried out by the authors have shown that the same process can occur with continuous overexertion of the tendons.

The experiments were carried out on dogs, and there was a continuous stimulation of certain muscle groups by electricity. In the first stages, fissures in the continuity of the tendons were observed, and later on deposits of lipoid were observed. The animals were kept on a diet free of cholesterol. The deposits of lipoids within the tendons caused the tendon to become weaker and prepared these areas for future fibrosis.

These experiments indicate that the tendons belong to the group of structures in which lipoids are often deposited, such as the arteries, the heart, the capsule surrounding certain abdominal viscera, and the eyeballs. George I. Reiss, M.D.

Epicondylitis of the Humerus (Epicondylitis humeri). Hans Kohlmayer. *Wien. med. Wschr.*, 1952, 2: 220.

The author discusses the etiology, pathogenesis, and treatment of epicondylitis of the humerus. This condition seems to have become considerably more frequent in central Europe during the war and postwar years, whether due to nutritional disturbances (starvation osteopathy) or to the fact that many people unaccustomed to manual labor had to work hard physically. Many other theories of the pathogenesis have been presented by different authors, viz., avitaminosis, rheumatism, neuritis, allergy, and others; however, none of these are well substantiated, and the question is still open.

This confusing multitude of theories concerning the pathogenesis of epicondylitis of the humerus corresponds to the large variety of therapeutic proposals.

The author disapproves all surgical procedures, as well as immobilization in a cast. In most cases diathermy, short wave treatment, and abstention from muscular activity is sufficient to cure the condition.

In severe cases, the author obtained the best success with intramuscular injection of orgapyrin, a highly concentrated solution of pyramidon. The spectacular success of this drug confirms his belief that epicondylitis belongs to the group of rheumatic disturbances. In some cases, a single injection of orgapyrin was sufficient to cure the painful condition. Werner M. Solmitz, M.D.

Treatment of Abscesses Associated with Spinal Tuberculosis. John H. Aldes. *Dis. Chest.*, 1952, 21: 562.

The fundamental principles in the treatment of abscesses associated with tuberculosis of the spine have not changed appreciably since 1779 when Percival Pott wrote about tuberculosis of the spine. Aspiration and surgical excision of sinuses and abscesses were often followed by recurrence and secondary infection.

It was not until 1944, with the advent of streptomycin, that treatment of tuberculosis of the spine, both conservative and surgical, progressed. With this new drug, surgical procedures for tuberculosis of the spine and for eradication of the abscesses and sinuses, first described two centuries ago, can again be used, only now without fear of serious complications.

In tuberculosis of the spine, the disease starts in either the central, epiphyseal, or anterior area of the vertebral body. It rarely begins in the posterior arch or transverse process. In the majority of cases the disease is of the central type.

When the tuberculous tissue invades and penetrates either the anterior or posterior cortex of the vertebrae, it accumulates beneath the anterior or posterior longitudinal ligament which is stripped from the bone and from the adjacent intervertebral disc. The tuberculous lesion thus may invade the bodies of the vertebrae, either above or below, without passing through the intervertebral disc. The tuberculous tissue may penetrate the posterior longitudinal ligament and spread over or completely encircle the dura of the spinal cord at the level of the disease.

When the lesion is of the epiphyseal or intervertebral articulating type, the disease begins in the upper or lower surfaces of the body, invades the intervertebral disc, and spreads through the nucleus pulposus to the adjacent vertebrae.

In the anterior vertebral involvement, the tuberculous lesion begins in or near the anterior cortex, and extends up and down the spine beneath the anterior spinal ligament, and thereby penetrates and erodes the anterior portion of the adjacent vertebral bodies.

The abscess cavity contains cell debris, caseous material, and liquid which is purulent in character. During the active stage of the disease the wall of the abscess, which is composed of tuberculous granulation tissue backed by fibrous connective tissue, secretes, or at least permits, the passage of fluid into the cavity. The abscess increases in size and burrows through the surrounding tissue, following the path of least resistance.

With the paravertebral abscess, if the x-ray film shows the abscess shadow to be enlarging, aspiration should be tried first. If aspiration is unsuccessful—

whether or not any neurological symptoms are present—costotransversectomy is performed. In this procedure, a complete incision and drainage of the abscess must be carried out, with removal of the granulation tissue and any presenting sequestra. A small rubber drain is left in the wound for 72 hours. The wound usually heals over completely within 14 days.

The psoas abscess, which is a deep, burrowing process situated along the sheath of the iliopsoas muscle, and usually extending from the region of the twelfth dorsal, and first and second lumbar vertebrae to the insertion of the psoas muscle in the lesser trochanter of the femur, can be excised in its entirety through a lateral extraperitoneal approach.

The initial surgical procedure prior to any fusion should be the eradication of any abscess.

For multiple posterior tuberculous sinuses and subcutaneous abscesses, usually found in the dorsal area of the back, complete débridement must be carried out. All granulation tissue must be removed until only healthy tissue remains.

C. Fred Goeringer, M.D.

The Traumatic Necrosis of the Talus (Die traumatische Talusnekrose). Hans Jud. *Zschr. Orthop.*, 1951, 81: 441.

Although the blood supply to the talus is not definitely known, two facts have been brought to light: (1) in many instances the main artery enters the talus in the superior aspect at the junction of the neck and the main body of the bone; (2) the proper blood supply of the talus depends also upon the soft tissues surrounding it. It has been found that even if the main blood supply to the talus is interrupted, a sufficient amount of blood is carried to the bone by the ligaments attached to the bone. In cases in which a dislocation of the talus has not been reduced immediately, the second and very important source of blood supply to the bone is permanently interrupted. An interruption of blood supply to the bone manifests itself in the roentgen examination by increased density of bone. The increased density usually appears in about the third or fourth month after injury. A similar finding occurs in cases of aseptic necrosis of the head of the femur. There are, however, cases in which condensation of the bone is seen in the roentgen examination within about 3 weeks after the trauma. This phenomenon is explained by the fact that a portion of the blood supply is preserved and new bone is formed around the necrotic bone trabeculae. The increased bone formation, in addition to the underlying dead bone trabeculae, causes increased density of the bone within about 3 weeks.

The usual course of the necrosis of the talus follows a well known pattern. Usually 3 months after the trauma, a relative density occurs. The phase of transformation takes place which is characterized by sclerosis on the roentgen examination. The stage of reparation follows which is characterized by changes in the architecture of the bone, with the formation of partial or total necrosis of the bone. An early appearance of increased density of the bone is prognostically a much more favorable sign, inasmuch as it indicates that the disease will follow a much shorter course.

The treatment consists of preservation of the structure of the talus by preventing weight-bearing on the affected extremity for a period of at least 6 months. In spite of the most effective therapeutic measures, the ultimate result of aseptic necrosis of the talus is still unsatisfactory.

George I. Reiss, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Surgical Elbow Pseudarthrosis for Impaired Pronation and Supination (La Pseudarthrose intentionelle du cubitus dans les troubles de la prosupination). M. Guilleminet and R. Lacour. *Rev. chir. orthop.*, Paris, 1952, 38: 3.

While a pseudarthrosis of the lower humerus does not interfere with the elbow motions, nonunion of the radius offers more difficulties because of muscular imbalance which forces the upper radial fragment in supination without the possibility of active motion. In the humeral pseudarthrosis the pronation and supination are preserved because of the intact pronator teres when the supinators are functioning. However, instead of spontaneous "providential" operations, intentional ones should be aimed for.

In a case of completely restricted and fixed pronation, a subperiostal resection between the middle and lower third of the radius is made with interposition of a musculoaponeurotic flap from the triceps muscle which leads to a fibrous pseudarthrosis with excellent motion. A Kirschner wire serves as a temporary guide. About 15 to 20 mm. of bone are resected. The operative procedure is very simple and 70 days after operation active motions are started.

The procedure also seems promising in Madelung's deformity. Ernest H. Bettmann, M.D.

Results of Insertion of Cancellous Bone in Cases of Pseudoarthroses of the Carpal Navicular (Behandlungsergebnisse der Spongiosaauffuellung bei Kahnbeinpseudarthrosen). Otto Russe. *Zschr. Orthop.*, 1951, 81: 466.

The ability to use a wrist joint with pseudarthrosis of the carpal navicular bone is diminished to 30 per cent in the average case. Bohler uses four routine x-ray examinations of the wrist in cases in which pseudarthrosis of the carpal navicular bone is suspected. In one position the forearm is kept in pronation with the hand forming a fist. The second view is a true lateral view. In the third view the wrist joint is kept in 45 degrees of pronation, and in the fourth view it is kept in 60 degrees of pronation with the central ray running from dorsalulnarly to volar-radially.

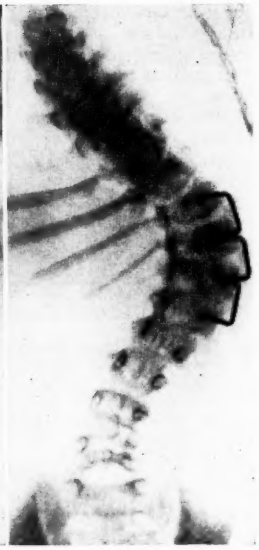

Fig. 1 (Bertrand) Fig. 2

In fresh fractures immobilization of the wrist in plaster should be considered. The next step is Beck's drilling of the fracture site. Heim advocated the removal of a portion of the carpal navicular bone or the entire navicular bone in persistent pseudarthrosis. This type of treatment has been completely discarded. Matti's treatment of pseudarthrosis of the carpal navicular bone is preferable to the routine method of insertion of a bone graft by means of the dorsal approach. Matti uses the volar approach; an incision about 2 inches in length is made just radially to the flexor carpi radialis. The incision is then carried down to the fracture site. As a rule, the median nerve and radial artery are not visualized within the operative field. By hyperextension of the wrist the entire navicular bone can be brought into the operative field. The advantage of the volar approach in this procedure is the fact that the blood vessels entering the carpal navicular bone on its dorsal aspect are not disturbed. Furthermore, the structures in the "anatomic pouch" are not upset. From the cosmetic point of view the volar incision is also preferable. The fibrous tissue between the fragments is then removed, and cancellous bone removed from the iliac crest is then placed between the fracture ends and into the cavity created by the removal of the fibrous tissue between the fracture ends. Union occurred in from 80 to 90 per cent in the 19 cases treated by this method. The utilization of cancellous bone taken from the iliac crest is preferable to bank bone. In 2 cases bank bone was used and nonunion occurred in 1 of the 2 cases. No other complication was observed. In cases in which degenerative arthritis was observed on x-ray examination, an arthrodesis of the wrist joint was performed.

GEORGE I. REISS, M.D.

New Aspects for the Surgical Treatment of Severe Spinal Curvatures (Notions nouvelles dans de traitement chirugical des scolioses graves). PIERRE BERTRAND. *Rev. chir. orthop.*, Par., 1952, 38: 33.

There are 2 methods of surgical treatment in cases of spinal curvature: vertebral osteotomy and epiphysiodesis in the adolescent. To submit the patient with a fixed scoliosis to gymnastic therapy is only pseudotherapy. The mobile scoliosis may get worse in spite of the corset and the bone graft. Attempts at resection of the convex segment have not succeeded because of the great operative risk. Instead, the osteotomy is done similarly to the method of Smith Petersen in ankylosing spondylitis. After resection of the interspinous ligament and the ligamentum flavum on the convex side, the lamina is exposed and the facets are resected. After sectioning the zygapophysial joints the lateral portion of the vertebra is exposed and a costotransversectomy is performed with resection of the posterior lamina. A bone graft (clothes pin type of Bosworth) is added and a corrective plaster bed or corset is applied.

The author, who presents some x-ray corrections, believes that this procedure is indicated only for the severe curvatures (11 cases with 1 mortality). One patient gained 7 cm. in height. In younger patients the epiphysiodesis with staples (according to Blount) applied to the vertebral epiphyses at the convex side is recommended (Figs. 1 and 2) with insertion at the height of the curve. The operation is done through a window in a cast with preceding correction. The operation is a difficult one. After 4 months the plaster is replaced by a celluloid corset. It is too early to judge the end results in the 7 cases reported by the author.

ERNEST H. BETTMANN, M.D.

Reposition with Arthroplasty for Congenital Dislocation of the Hip in Adults. R. MERLE D'AUBIGNÉ. *J. Bone Surg.*, 1952, 34-B: 22.

This article is based on 32 operations on 28 patients with congenital dislocation of the hip. All of the patients were more than 18 years of age; 2 were under twenty, 15 were between 20 and 30, 6 were between 30 and 40, and 5 were more than 40 years old.

Preoperative traction was thought useless and was therefore omitted. All of the operations were performed under general anesthesia and on an ordinary operating table without screw traction apparatus. The whole capsule was excised. The cavity of the acetabulum, always small, was enlarged posteriorly and superiorly; atrophy of this part of the iliac bone frequently made it difficult to obtain an adequate cavity without the risk of fracture. The anterior and posterior margins of the acetabulum were clearly exposed so that the cavity could be deepened at the

Fig. 1

Fig. 2

Fig. 1 (D'Aubigné). Bilateral congenital dislocation in 18-year-old patient. There was little pain, but walking was limited. Fig. 2. After bilateral arthroplasty with an acrylic prosthesis and the construction of a shelf from the femoral head. There was good morbidity and stability on the right side 4 months after the first operation; 3 months after the second operation the patient was beginning to walk.

correct point. In one case the capsule was used, as described by Colonna (1947), with a good result. A Smith-Petersen cup was applied in 16 cases and a Judet's acrylic head in 13 cases. Acrylic material seems particularly useful when the head and neck of the femur are small and atrophic, because it restores some length to this part of the femur. Whatever material is used, it is essential to resect as little of the femoral head as possible.

Reduction is sometimes surprisingly easy; in other cases strong and prolonged leverage is necessary. Only in 2 cases was it impossible to bring the head down, and the acetabulum had to be cut a little higher. A wedge-shaped shelf made with a piece of the femoral head or of the iliac bone and fixed with a screw is a useful means of completing the anterior part of the roof of the acetabulum. The greater trochanter is lowered 1 or 2 cm. and fixed with a wire.

In the postoperative care immobilization in plaster is necessary for 3 to 4 weeks.

No patient died from complications. In 3 cases, shock made prolonged resuscitation necessary. Redislocation occurred in 7 cases. Closed reposition was possible in 3 cases, but a second redislocation in 2 of these required open operation with deepening of the acetabulum and application of a shelf. In 2 other cases open reposition was performed without previous recourse to closed reduction.

As to anatomical results, postoperative roentgenographs showed the femoral head placed exactly normally in 12 cases, slightly higher in 14, and elevated but apparently normally in 6.

Only 1 patient had no pain before operation, and she remained pain-free after it. Among 19 other patients, preoperative pain was unchanged in 2, diminished in 10, and relieved in 7. Mobility was assessed in 33 patients. Sixteen had a normal or exaggerated mobility of the affected hip or hips before operation; this mobility was greatly reduced in 4 (flexion limited to 60 degrees), slightly reduced in 7 (flexion limited to 80 degrees), and unchanged in 5. In 7 patients with limited mobility before operation, the mobility was unchanged in 2 and increased in 5. Stability is good and consequently the limp is generally reduced. Mobility is as a rule sufficient, although it is often less than it was before operation when the hip was normally or excessively mobile. Pain is very often relieved or greatly reduced, but walking is generally limited. Even if the roentgenographic appearance of the hip is almost normal, the functional result may be imperfect.

C. Fred Goeringer, M.D.

FRACTURES AND DISLOCATIONS

Carpometacarpal Dislocations. The Total Dislocations (Les luxations carpo-Métacarpiennes. Luxations totales en particulier). J. Aulong and J. Girard. *Rev. chir. orthop.*, Par., 1951, 37: 439.

Complete dislocation of all 5 carpometacarpals is a very rare occurrence. The case reported was that of a man thrown from a motorcycle at high speed with a markedly swollen left hand, the x-rays showing a complete carpometacarpal dislocation. The first reduction under general anesthesia was unsuccessful on account of a transversally lodged first metacarpal. After a second successful reduction the hand was put in a cast for 3 weeks. The functional as well as the anatomical result was very satisfactory.

This case shows that not the dislocation of the 4 metacarpals but the dislocation between the trape-

zoid and the metacarpal is the chief problem, because proper reduction is difficult to obtain. This has been observed by a great number of authors. Of 29 patients 8 had dislocation of only one metacarpal, 12 of two metacarpals, 2 of three metacarpals, and 7 of four metacarpals. The immediate posttraumatic edema makes an exact diagnosis impossible without roentgenography. Because in some cases the fingers can be moved freely these cases have been overlooked. In 1 case muscle atrophy, loss of muscle power, and posttraumatic arthritis developed 35 years after the injury.

After reduction by traction the reduction is maintained in hypertension by ladyfingers or pulp wire traction, with change of plaster after disappearance of the edema and early mobilization if possible. Open reduction becomes necessary after 2 weeks on account of early adhesions. Either arthrodesis or resection of the basal matacarpal region is the operation of choice. ERNEST H. BETTMANN, M.D.

The Pertrochanteric and Subtrochanteric Fractures (Les fractures trochantériennes et juxtatrochantériennes). J. O. RAMADIER and J. TEINTURIER. *Rev. chir. orthop.*, Par., 1952, 38: 13.

The average age of patients in whom these fractures occur is about 70 years, and the fractures are twice as frequent in females as they are in males.

While there is no risk with conservative functional treatment in adults, the prognosis becomes more grave in the aged. The plaster cast is often poorly tolerated, causes knee stiffness, and does not prevent coxa vara deformity, even with the opposite side immobilized. Continuous traction with the transtibial pin secures good position, but may cause chronic bed sores because of the prolonged bedrest. Other complications are: urinary infection, late thrombosis, embolism, and progressive senile cachexia. The total average time of hospitalization is about 4 to 5 months. The mortality is between 15 and 39 per cent.

It is often impossible to maintain the initial normal neck angle. The osteosynthesis, on the other hand, cuts down the mortality, allowing for early mobilization (with conservative treatment Cleveland and Bickel had a mortality of from 25 to 34% and with surgical treatment, of from 8 to 12%). Instead of the division in basicervical, cervicotrochanteric, pertrochanteric, transtrochanteric, intertrochanteric, and subtrochanteric types, only 3 essential types are to be differentiated for the choice of internal fixation. In 2 types the bitrochanteric mass remains intact.

Type 1. Basicervical or cervicotrochanteric with impaction in the coxa vara position. The Smith-Petersen nail alone is insufficient and immobilization is done with an additional wire circlage at the distal end in the subtrochanteric level.

Type 2. Subtrochanteric. The fracture line is horizontal and there is no impaction. For such types of fracture, the author uses the Kuntscher nail.

Type 3. Transtrochanteric fractures with oblique fracture lines and an intermediary fragment detached often from the posterior surface of the greater or the smaller trochanter with destruction of the massive trochanter, where the nail combined with a plate is the method of choice (21 cases).

The intramedullary nailing for the subtrochanteric fractures with an intact trochanter region is technically easy. With the patient in lateral position the posterior external plane of the greater trochanter is exposed with the lateral vastus and the gluteus maximus. To avoid postoperative rotation a transtibial Steinman pin is used with a cast for 3 weeks. Walking is resumed between the thirtieth and fiftieth day. The operating time was only 25 minutes.

Blade (pin) plates were used by Blount, Jewett, Neufeld, and McLaughlin. McLaughlin's type is most frequently used. Although consolidation will require 3 or 4 months the patient may resume walking with a crutch but without weight-bearing after 2 weeks. In some cases breakage was noted because of the inadequacy of the material used. Of 32 patients who were operated upon, 3 died and 29 showed good functional results. The surgical treatment is far superior to the old conservative methods.

ERNEST H. BETTMANN, M.D.

Internal Fixation for Intertrochanteric Fractures. G. S. LEVENTHAL. *Bull. Hosp. Joint Dis.*, N. Y., 1951, 12: 41.

To restore good function intertrochanteric fractures should be treated so that the valgus of the neck is restored to normal. This can best be accomplished by open visual reduction and internal fixation. Formerly, the fracture was reduced, the reduction checked by x-ray films, a guide wire was inserted, and its position was checked by x-ray films. A Neufeld nail was driven in with the wire as a guide. This method has been discarded and open reduction is now performed. The Neufeld nail was used in all cases except 1. All of the rational patients were helped out of bed into a wheelchair the day following surgery.

The end result presented some coxa vara deformity in 3 cases because the nail broke. The remaining 17 patients healed with a normal valgus. Open reduction and internal fixation were carried out as soon as possible after the injury.

RICHARD J. BENNETT, JR., M.D.

The Conservative Treatment of Trochanteric Fractures of the Femur. RAPHAEL R. GOLDENBERG and ANTHONY J. SANTORO. *Bull. Hosp. Joint Dis.*, N. Y., 1951, 12: 27.

The authors' series of cases consists of 100 unselected trochanteric fractures of the femur. The average age of the patients was 74 years. There were 68 females and 32 males. Fifty-eight fractures involved the right lower extremity and 42 were on the left side. One patient was treated in a plaster spica. Skeletal traction was necessary in 1 case and 98 patients were treated by Russell traction.

The technique of traction application is described and complications of traction are discussed. The mortality rate was 16 per cent. Sixty-five per cent of the surviving patients obtained good functional results. The end results obtained are attributed to careful medical supervision and to a careful follow-up of the Russell traction apparatus.

RICHARD J. BENNETT, M.D.

Prefractural Status of the Femoral Neck (État préfracturel du col fémoral). J.-J. DUFOUR. *Helvet. chir. acta*, 1952, 19: 15.

Acting upon a suggestion made by Professor Rutishauser, the author has undertaken the study of the upper end of the femur in 50 cadavers, all but 8 of them being of subjects more than 70 years of age. In 25 of these specimens a fracture of the femoral neck was present and in these instances the opposite, or contralateral, femur was the one studied.

All of these fracture cases were in the age group of over 70 years. In 6 of these specimens the upper end of the femur was decalcified (nitric acid), embedded in celloidin (in one instance in paraffin), and sectioned for histologic study. In another 17 cases, macerated specimens (sodium hydroxide) were prepared. In all, roentgenographic study was performed.

The histologic study of the femurs of these aged subjects disclosed a marked degree of hyalinization of the arteries, and congestion (venous varices) of the veins supplying the region of the femoral neck. These disturbances of blood supply were of such a degree in appearance as to warrant the assumption that they represented one of the causal factors in the production of the widespread osteonecrotic foci in these specimens (JAFFE and POMERANZ. Osseous Anoxemia. (*Arch. Surg.*, 1934, 29: 566).

A study of the macerated specimens also suggested that the theory of senile osteoporosis would not clarify all the findings encountered. These specimens brought out more clearly than the roentgen studies the peculiarities of the aging femoral neck and head. The first peculiarity noted is that the osteoporotic processes do not advance uniformly with the age of the subject, nor indeed as between different subjects; a woman of 90 may have a solid cortical and trabecular structure, while one of 70 may cause astonishment by the fact that she can stand up and walk at all, so extreme is her loss of bony supportive tissue in the region of the upper end of the femur.

In general, there are two types of this form of osteoporosis (ignoring transition forms): (1) a diffuse atrophy affecting all the elements of the bone structure and transforming the spongiosa into a regularly structured but delicate reticulum, where, however, the general architecture is not clearly apparent or entirely normal, and (2) a focal form of atrophy with the development of irregularly localized cavitations within the trabecular structure. These cavitations, although irregularly localized with reference to the normal, show, nevertheless, a certain system with reference to one another and to the different structural elements of the femoral neck. For instance, the complete loss of trabeculae generally involves the so-called area of fanning-out of the weight-bearing trabecular system (*éventail de sustentation*), and tends to spare the cortical area, particularly the cortex of the inferior surface of the arch of the femoral neck; this area, as a matter of fact, tends to be thicker and solider than normal.

Not only are actual cavitations formed, but the trabeculae individually are shortened, thickened, and widely spaced throughout the entire field. The cortex in many cases appears lamellated or contains longitudinally directed, flattened defects so that it is at times difficult to determine which is cortex and which is spongiosa.

All these changes the author ascribes, not to a simple process of senile osteoporosis, but to the development of foci of osteocytic necrosis which, instead of healing, undergoes resorption (résorption disséquante), resulting in the focal, or systematized, form of osteoporosis described.

The author believes that the foci result from two causal processes:

The first process which develops is probably to be explained as an anoxemia of the bony tissues in the region of the femoral neck, resulting from the blood vascular changes described. The other process is considered to be identical with the general concept of the syndrome of overloading which has been under discussion in the literature for a number of years (v. TUCKER, F. R. *Am. J. Bone Surg.*, 1949, 31-B: 82).

In these aged individuals, the above described processes do not go on to healing in the classical manner, with the formation of Looser zones (French: *zones de remaniement;* German: *umbauzonen*), because of the absence of functioning periosteum and endosteum.

Whatever the origin and pathogenesis of these osteoporotic manifestations, they would seem to prepare for the tendency toward fracture of the femoral neck in the aged, and to account for the fact that such fractures are so often spontaneous ones.

JOHN W. BRENNAN, M.D.

Remarks with Reference to the Mechanics and the Technique of Nailing of Fracture of the Femoral Neck (Einige Bemerkungen zur Mechanik und Technik der Schenkelhalsnagelung). HEINZ GELBKE. *Acta. Soc. med. Upsaliensis*, 1952, 56: 253.

At the University Clinic, in Goettengen, Germany, the nail described by Becker (*Chirurg*, 1949, p. 640) is being used; however, they have added at the outer end a number of toothlike notches which are intended to prevent the slipping backwards of the nail, causing it in this manner to lose its grasp on the fragment consisting of the femoral head, as shown in Fig. 1.

In order that no unnecessary pull or rotation stresses be put upon the healing fracture line, the nail is inserted at an extremely steep slant; that is,

Fig. 1 (Gelbke). Kuentscher nail in place.

the entrance aperture for the nail on the lateral surface of the femoral shaft is closed as low down as possible in order that the shaft of the nail will pass just above the arch of Adam (lower cortical wall of the femoral neck) and engage in the upper, or proximal, area of the femoral head itself. This oblique transfixion of the neck and head of the femur will also prevent any tendency of the head to rotate on the neck.

The apparatus that is used in applying the nail is not expensive or complicated and is easy to employ. The nails consist of V-shaped steel rods, or nails of from 12 to 15 cm. in length. The place for driving in the nail is marked percutaneously by means of small marking nails, under roentgenologic control. The drill, a hand-manipulated affair, is introduced through the cortex by the aid of the marking nail and then a 33 cm. steel rod, of the same diameter as the marking nail, is passed through the central canal of the drill—after removal of the nail—and is driven along the course which the Becker nail is to traverse, to, and eventually through the cartilaginous covering of the caput femoris into the bone tissue forming the floor of the acetabulum. This actual traversing of the articular cavity and transfixion of the bony pelvis is done for the purpose of better fixing the fragment of the femoral head while the nail is being driven into it. The drill is then removed and substituted by the nail itself, which is then driven along the course marked out for it by the guiding rod, into the region of the head of the femur, as indicated in Fig. 1.

In the original text the author discusses the deficiencies of the nail directions as recommended by Boehler and by Pauwels, and, by means of appended diagrams and roentgenograms of actual patients, shows that the objections to their use are not only of theoretical interest, but are actually of practical significance in these cases.

JOHN W. BRENNAN, M.D.

Fractures of the Shaft of the Tibia and Fibula. EARNEST B. CARPENTER, JOHN J. DOBBIE, and CHRISTIAN F. SIEWERS. *Arch. Surg.*, 1952, 64: 443.

This article explains the end results obtained in the treatment of fractures of the shaft of the tibia and fibula. There were 135 fractures in 123 patients. Only fractures of the shafts of the long bones are included. The fractures of the shaft of the tibia and fibula are divided into five categories. There were 108 males and 27 females. Their average age was 37 years and their average hospital stay was 21 days. There were 4 deaths. Postoperative infection appeared in 10 cases and there were 9 amputations in this group of 135 patients.

There was nonunion in 6 cases and delayed union in 22 cases. The longest period of immobilization was 50 weeks. There were 19 cases of simple fracture, 43 cases of simple comminuted fracture, 1 case of compound fracture, 75 cases of compound comminuted fractures, and 9 cases of compound comminuted multiple severe fractures.

The authors are of the opinion that the more extensive the compound wound, the greater the indication for internal fixation of the underlying fracture. The most important point of all in the treatment of these fractures, they believe, is the application of a firm, snugly fitting cast with a minimum of sheet wadding. RICHARD J. BENNETT, JR., M.D.

Conservative Treatment of Fractures of the Tibial Plateau. CARL E. BADGLEY and SYLVESTER J. O'CONNOR. *Arch. Surg.*, 1952, 64: 506.

Cotton referred to the fractures of the lateral tibial plateau as bumper or fender fractures. In recent years 18 types of fractures of the tibial plateau were described by Mikkelson. The author differentiates three main types: (1) a large single fracture involving the articular cartilage which is depressed and laterally displaced, (2) severe compression with downward displacement of the articular surface of the tibia into the body of the tibia, and (3) lateral displacement with central depression of the main fragment.

The author treated 17 patients with skeletal traction on the lower legs by inserting a Kirschner wire into the distal end of the tibia and fibula or into the os calcis. By placing the injured leg into a Thomas splint with Pearson's attachment from 10 to 15 lbs. of traction were applied. The hemarthrosis was relieved by aspiration. The patients were kept in traction from 8 to 12 weeks and a definite program for active quadriceps exercises was begun as soon as possible. The leg was then placed in a walking caliper and active exercises were given. The results are described as very satisfactory and doubt was raised by the author whether these results could have been improved by any type of surgery.

The discussion was opened by JOHN R. MOORE of Philadelphia who stated that the title of the paper presented was misleading because it implied a discussion of fractures of both the medial and the lateral plateaus, yet the author discussed only fractures

of the lateral plateau. The discussor felt that open reduction was indicated in certain cases; he had used conservative treatment in some of his patients but failed to get as satisfactory a result as described by the author.

JOHN T. JACOBS of Denver pointed out that the economic factor of long hospitalization has to be taken into consideration in the treatment of fractures of the tibial plateau.

GEORGE I. REISS, M.D.

Treatment of Fractures of the External Tibial Condyle (Tratamiento de las fracturas del condilo tibial externo). L. DE LA SIERRA CANO and M. BLANCO ARGÜELLES. *Cir. ap. locomotor.*, Madr., 1952, 9: 48.

The authors have reviewed the recent English-language literature dealing with classification, pathology, and treatment of fractures of the lateral tibial condyle. They note the recommendations for and against operative treatment, and believe that the difference of opinion can be explained by the observations of Cornel, who found, in reoperations on patients previously treated for condylar fractures, that a reparative growth of fibrocartilage had restored a smooth surface to the tibial articular surface, but the roentgenograms did not show it.

For fractures in which the lateral articular surface is crushed downward, and for fractures in which the condyle is sheared off and separated, but with displacement of not more than 0.5 to 1.0 centimeter, the authors recommend a program consisting of: (1) immobilization in a splint with slight knee flexion until swelling has diminished (1 to 2 weeks), (2) massage, quadriceps contractions, and gentle active motion for another 1 or 2 weeks, (3) ambulation without weight-bearing, while continuing the active exercises, for a minimum of 10 weeks from the time of the injury, and (4) careful progressive weight-bearing thereafter. The results are good.

For the more severely displaced condylar fractures, surgical treatment is advised. A parapatellar incision is made and the large lateral fragment is reduced. When the articular surface medial to this has been depressed and crushed, the fragments are carefully raised to their normal position and extra bone taken from the tibial shaft is packed beneath them. Firm fixation of the lateral fragment is essential to keep the reconstructed articular surface in position; for this the Sherman screw is advised. The postoperative management of these fractures parallels that described for the nonoperative treatment of the less serious injuries.

CHARLES T. RYDER, M.D.

ORTHOPEDICS IN GENERAL

Homoplastic Bone Granulate as Implantation Material in Orthopedic Surgery. OLOV LINDAHL. *Acta chir. scand.*, 1952, 103: 23.

The need of bone material for reconstructive orthopedic surgery is a constant problem, as has been shown by the continued efforts of many investigators to find an adequate supply of optimum material. The principle of the use of bone secured at autopsy seems the practical procedure.

The particle size of transplanted bone remained a problem, and the author approached it on the assumption that the osteogenetic activity of the transplanted bone proceeds from the surface of the graft. The fact that more abundant formation of new bone is obtained with spongy bone than with compact bone supports the deduction that "the bigger the surface the greater the osteogenetic effect." Consequently the author has prepared autopsy femoral bone, according to a simple aseptic technique, into granulates of mixed sizes ranging from 0.01 to 2 mm., and kept at −20 degrees C. until needed. The granulate is white to pale yellow, and dry, with almost the same consistency as dry sand of similar size. It is known as homoplastic bone granulate, and has been used in 17 cases reported in this article.

Clinically and roentgenographically the granulate appears to be reconstructed rapidly—new bone, mature histologically, appearing about 4 months after operation. Healing has been without infection or any abnormal tendencies, although the observation period in some cases has been short.

Technically, production of the material is relatively simple, adequate amounts can be secured, and it can be stored in a bone bank until needed. The plasticity of the granulate is an asset in filling cavities and in molding bridges, but an adhesive substance which could be mixed with the granulate would further extend its usefulness.

FRANCIS E. BRENNECKE, M.D.

Experimental Investigations of the Mechanism of Spontaneous Rupture of the Tendons (Experimentelle Untersuchungen ueber den Pathomechanismus der spontanen Sehnenruptur). J. BORSAY, J. CSIPAK, and G. DETTRE. *Zschr. Orthop.*, 1952, 81: 552.

Experiments were carried out on rabbits and dogs in which stimulation of the muscles was produced with the electric current. There were two groups observed which showed characteristic changes. The first group showed changes occurring within the first 21 days; in the second group the changes occurred within 42 days.

At first a separation of the bundles of the fibers was observed. The separation occurred in several localized areas. Further investigation of these areas revealed that the tendon fibers within the bundles appeared to have been torn and had a wavy appearance. These changes were predominately observed on the posterior aspect of the tendon and close to its insertion.

In the second group, changes were observed which indicated further progress of the degeneration, but there were also signs of regeneration. The final disruption of the tendon occurred at the areas with the most degeneration. GEORGE I. REISS, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Nontraumatic Arterial Aneurysms of the Extremities (Les anéurysmes artériels non traumatiques des membres). P. WERTHEIMER, J. SAUTOT and J. CHEVALIER. *Lyon chir.*, 1952, 47: 129.

Nontraumatic aneurysms of the extremities are rare. The authors review some 200 cases appearing in the recent surgical literature. Eighty-five per cent of the lesions occurred after the age of 45 years and 89 per cent of the patients were males.

The authors present the data concerning 13 patients of their own with arterial nontraumatic peripheral aneurysms. Popliteal aneurysms are the most common lesion and occur in approximately 70 per cent of this series. Histologic studies indicate that atheromatous plaques and the resultant weakening of the arterial walls are the most plausible explanations for the nontraumatic lesions.

Not infrequently intermittent claudication may be the only clinical symptom present. Contrast arteriography is of paramount importance in establishing not only an accurate diagnosis but the extent of the lesion and the prospects for successful treatment.

The authors use both endoaneurysmorrhaphy and extirpation of the aneurysm. It is suggested that complete extirpation of the aneurysm provides the better result since the resultant defect can be repaired with vascular grafts which restore the arterial continuity. ORVILLE F. GRIMES, M.D.

Endarteriectomy, or Surgical Restoration of the Lumen of an Obstructed Artery, in Arteriosclerosis Obliterans. A. NÚÑEZ NÚÑEZ, B. MILANÉS, and J. RODRIGUEZ IÑIGO. *Circulation*, 1952, 5: 670.

The authors discuss the fundamentals of endarteriectomy, introduced by Dos Santos in 1946, and report on 4 patients who were treated by this method in the University Hospital of Havana, Cuba. Endarteriectomy is the restoration of the lumen of an obstructed artery by excision of a fixed thrombus together with the portion of the intima of the artery to which it is attached. The anatomic consideration on which the operation is based is the existence of a plane of cleavage between the endothelium and the tunica media of the arteries.

The authors believe that endarteriectomy is indicated in patients having ischemic disturbances, especially intermittent claudication, necrotic ulcer, or localized gangrene, and when arteriography shows arterial occlusion or severe narrowing. The ideal indication is when occlusion or severe narrowing is limited to a short length of artery and the segment distal to the obliterated zone is patent. When thrombosis involves a long segment of an artery, a complete restoration of flow will probably not be obtained by endarteriectomy but the circulation will be improved by the opening of collateral arteries.

The authors describe and illustrate their operative technique which is a modification of the techniques of Dos Santos and Reboul. In brief, a longitudinal incision is made in the arterial wall beginning above the proximal end of the thrombus and is continued to a point 2 or 3 cm. below the distal end of the thrombus. The intima is dissected from the media in its total circumference at the proximal end and cut transversely. The thrombus is liberated with slight traction, and by use of a thin curet the thrombus is scraped off together with the coat formed around it by the intima. This is continued 2 cm. beyond the distal end of the thrombosed segment. The artery is closed by a running suture. Lavage of the artery is continued throughout the operation, with a solution containing procaine and heparin. Heparin and dicumarol are given systemically immediately after the operation.

The authors performed endarteriectomy in 4 cases, in 3 for thromboses of the femoral artery, and in 1 for a thrombus involving the distal aorta and both iliac arteries. In 1 patient a good anatomic result was obtained, as shown by postoperative arteriography. In 1 patient a good functional result was obtained although arteriography showed that the lumen was still occluded. The improvement was attributed to an increase in the collateral circulation. The patient with the thrombus of the aorta and iliac arteries died 5 days after operation with a massive retroperitoneal hematoma. The last of the 4 patients was benefited functionally after operation but an arteriogram was not done to show the anatomic result. WILLIAM T. FITTS, JR.

Heterogeneous Arterial Grafts (Greffes artérielles hétérogènes). J. SAUTOT, J. BOST, and Y. TOURAINE. *Presse méd.*, 1952, 60: 244.

The authors studied the question of heterogeneous arterial grafts in animal experiments.

The graft material was taken from the carotid and iliac arteries of calves and preserved by different methods. The specimens were examined histologically after several weeks or months. The best results of preservation were obtained when the specimens were cooled brusquely by dry ice to a temperature of minus 70°C. and preserved at this temperature in a solution containing phenergan and a high amount of heparin (175 mgm. in 200 c.c.).

The specimens were grafted, partly to the carotis of horses (3 cases) and partly to the abdominal aorta of dogs (9 cases). The grafts in the horses were all failures, the arteries were thrombosed, and subsequent histologic examination showed necroses of the media and marked fibrous reaction of the adventitia and the surrounding tissues.

Of the 9 cases of grafting in dogs, 5 were failures and 4 were clinical successes. However, even in the successful cases in which no thrombosis developed and the arteriogram was normal, the subsequent histologic examination revealed more or less marked destruction of the media and the adventitia.

WERNER M. SOLMITZ, M.D.

Deep Venous Thrombosis in the Leg Following Effort or Strain. CHILTON CRANE. *N. England J. M.*, 1952, 246: 529.

Venous thrombosis is twelve times more common in leg injuries than in other cases. The thrombosis of the legs brought on by effort or strain has received little attention. This report presents 13 case histories and data on 10 additional cases from the literature. The probable causative mechanisms are markedly increased pressure in the femoropopliteal veins, as in straining, muscular contractions in the limb, as in such efforts as jumping and lifting; and peripheral venous engorgement from extreme anatomic venous angulation in the popliteal space, as in kneeling or squatting. It may also be caused by tendinous pressure on the popliteal vein. The primary lesion in this type of thrombosis seems to be an injury to the wall of the venous trunk with thrombus formation. The rare occurrence of thrombosis after forcible rupture of communicating veins from stripping of the saphenous vein suggests that injury to branches at a distance from the main trunk is harmless.

The differential diagnosis of thrombosis from muscle strain is made on the following bases:

1. Stiffness, pain, and disability of the latter are due to hematoma formation, and approach their height in 4 to 24 hours, but in thrombosis they usually require from 2 to 7 days.

2. Edema, if any, in muscle strains, appears in a few hours and is local, while in thrombosis it is diffuse and appears in 2 to 7 days.

3. The tenderness and induration of a strain are limited to the area of the muscle tear and hematoma, while in thrombosis they follow the course of the vascular trunks.

4. Muscle rupture often leads to ecchymosis, but thrombosis rarely does so. Dilatation of the superficial veins and a bluish tint to the leg help confirm the diagnosis of thrombosis.

Treatment of venous thrombosis consists of strict bedrest with elevation and compression bandaging of the legs and leg exercise until all symptoms have subsided. Anticoagulants are desirable. Femoral vein division should not be considered unless pulmonary embolism has supervened or the signs and symptoms persist after 6 to 8 weeks of conservative therapy.

ALBERT M. SCHWARTZ, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Reanimation with Endocarotid Transfusion in a Cranial Direction (La rianimzaione con trasfusione endocarotidea in senso craniale). A. M. Dogliotti, A. Costanini, G. Dei Poli, and L. Caldarola. *Minerva med.*, Tor., 1952, 43: 893.

The authors worked on the assumption that in severe traumatic shock or blood loss the most dangerous lesions were first established in the central nervous system and that carotid artery transfusion directed toward the cranium was the most efficacious method of reanimation.

A dog weighing 10 kgm. was subjected to endotracheal anesthesia and its common carotid artery was divided. The caudal end was ligated so as to prevent blood reflux toward the heart. A cannula was inserted in the other opening, toward the brain, and a ligation was done.

A thoracotomy was performed on the left side and the eighth rib was removed. The pericardial sac was opened widely and then sutured to the parietal wall so as to exclude the pleural cavity. In this manner the heart was readily visible and the respiratory movements were easily observed.

About 500 c.c. of blood were rapidly removed from the femoral artery and collected in a bottle with an anticoagulant. This represented 5 per cent of the dog's weight. During this time the respirations ceased, the blood pressure dropped to zero, and the heart stopped beating, in the order mentioned. The blood was then transfused back into the carotid artery. There was an immediate response with return of the cardiac beat, blood pressure, and respiration.

Three clinical cases are briefly mentioned, in which severe shock was readily controlled by means of carotid artery transfusions.

Lucian J. Fronduti, M.D.

Intra-Arterial Infusion—Simplified Technique. John E. Keet, George O. Halsted, Vincent J. Collins, and Louis M. Rousselot. *J. Am. M. Ass.*, 1952, 149: 418.

This technique is adaptable to any commercial blood, plasma, or gelatin bottle having a needle air vent. The most satisfactory recipient apparatus is the special pressure set with double filters and outflows, which are more efficient, convenient, and safe. The pressure pump consists of a hand bulb from a sphygmomanometer connected through a "y" metal adapter to the air inlet of the blood bottle and manometer. In order to assure sterility, an 18 inch length of sterile expendable plastic tubing is interposed between the pressure pump and blood bottle. The arterial cannula consists of a 15-gauge spinal needle cut off to 1¼ inch and having a blunt end. The stylet is sharpened to a pencil type point and protrudes slightly beyond the end of the cannula to facilitate the arterial puncture.

A longitudinal incision is made over the radial artery. The artery is entered directly with the cannula in a centripetal direction. One per cent procaine is infiltered around the artery to minimize spasm. After the blood tubing is filled it is clamped near the arterial end and pressure is increased in the closed system to approximate 100 mm.Hg. The blood bottle is hung at the same level as the patient's heart, and, when the clamp is removed, blood will flow until the pressure in the bottle balances the patient's mean arterial pressure. If the system does not transmit pressure freely, it may be due to arterial spasm, which can be eliminated by procaine (1% or 2%) injected into the stopcock or stellate ganglion blocks. The use of intra-arterial procaine in unanesthetized patients is not recommended, but stellate ganglion blocks are indicated. Blood clots forming in the cannula can usually be aspirated with a syringe attached to the stopcock.

If fairly high flow rates of blood are maintained, it is probably wise to cut the flow down to a very slow drip every half hour and allow the arm to be perfused with oxygenated blood for a few minutes. It has been found more advantageous to maintain the flow rate at a slow drip, increasing the speed of infusion only to attain the physiologically adequate mean pressure.

When it is desired to stop the infusion, the cannula is simply removed and pressure is kept on the artery until the bleeding stops. The pressure should be sufficient to stop the bleeding and still allow the blood to flow through the artery.

Lee Pullen, M.D.

Fatal Pulmonary Embolism in the Heidelberg Clinics. Study of 377 Cases over a 20 Year Period. (Die toedlichen Lungenembolien an den Heidelberger Kliniken. Untersuchungen von 377 Fällen der letzten 20 Jahren). Kurt Spohn. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1951, 269: 518.

Of 377 cases of fatal pulmonary embolism observed in various hospitals of Heidelberg over a 20 year period, 49.0 per cent occurred on the surgical service, 23.0 per cent in the department of gynecology, 18.2 per cent in the clinic for internal diseases, and the remainder in various other departments of the University or in other city hospitals.

Pulmonary embolism was the cause of death in 1.47 per cent of the entire autopsy material and in 0.166 per cent of all surgical cases admitted to the hospitals. The frequency of fatal pulmonary embolism following operations was 0.154 per cent. Overweight was recorded in 46.33 per cent of the patients who succumbed to pulmonary embolism, normal weight in 23.66 per cent, and underweight in 30 per cent.

The greatest number of cases occurred in the seventh decade, and 71.3 per cent of the patients were more than 50 years of age.

Of 377 emboli, 192 followed operations. In 66.2 per cent of all the cases, cardiac and vascular lesions were found. Malignant tumors predispose to embolism.

The period between the fifth and eleventh days after operation is the most dangerous.

The type of anesthesia has no influence on the frequency of postoperative embolism.

The rise of the temperature, fall of the atmospheric pressure, shift in "fronts," and excessive humidity favor the development of embolism.

JOSEPH K. NARAT, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Repair of the Soft Tissue in Orthopedic and Traumatic Surgery (Reparação das partes moles em cirurgia ortopédica e traumatológica. LAURO BARROS DE ABREU. *Rev. Hosp. Clín.*, S. Paulo, 1952, 7: 41.

This article gives a fast-moving review of the various methods available for reconstituting defects of the soft tissues. It includes in schematic form the basic principles upon which skin and soft tissues may be made available, from whatever source, to cover defects existing therein. The experience is derived from the management of 135 cases and covers 154 grafts and 79 flap or other plastic procedures.

The author concludes that soft tissues injuries are sometimes more important than those of the bones themselves. Skin grafts and flaps hasten and simplify treatment; the prognosis of the case very often depends upon them. With the present development of reparative surgical principles, the only strong indication for amputation of a wounded limb is the lack of blood supply. The orthopedic surgeon has to be familiar with skin-grafting techniques in order to solve many of his problems. Besides local immobilization, the immobilization of the limb with plaster casts is often important for successful grafting. Careful mapping of the program of repair in advance is important, if uniform success is to be expected.

HIRAM T. LANGSTON, M.D.

ANESTHESIA

Aspiration and Aspiration Pneumonia (Ueber Aspiration und Aspirationspneumonie). E. STUTZ. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1951, 269: 484.

According to a prevailing opinion, repeated aspiration of liquid or solid particles of foodstuffs leads to aspiration pneumonia. Such "chronic" aspiration takes place in the presence of anatomic defects in the organs of deglutition, or in the presence of functional disturbances of the swallowing act. Esophagotracheal fistulas of congenital, traumatic, syphilitic or neoplastic origin, or a spreading necrosis of paratracheal lymph nodes may produce esophagolaryngeal or esophagotracheal fistulas. Congenital defects, traumas, or specific processes of the epiglottis may be responsible for chronic aspiration. Functional disturbances develop as a result of cerebral or bulbar diseases or lesions of the superior or inferior laryngeal nerve, the glossopharyngeal, or the recurrent nerves.

The author was able to demonstrate roentgenologically the chronic aspiration of food in 8 patients. The aspiration was well tolerated over a period of many years and caused aspiration pneumonia only when other injurious factors, such as traumatic shock, old age, anesthesia, respiratory infection, or cachexia complicated the picture. Apparently the physiologic defensive functions of the lungs, namely, cough, ciliary activity, activity of the bronchial epithelium, and alveolar phagocytosis, provide sufficient protection of the organ.

JOSEPH K. NARAT, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Medical Air Evacuation in Korea and Its Influence on the Future. ALLEN D. SMITH. *Mil. Surgeon*, 1952, 110: 323.

The author describes medical air evacuation in Korea, and reports on the advantages gained thereby. Because of the character of the Korean terrain, it became necessary to develop rapidly newer methods of evacuation which have saved lives, reduced suffering, and immeasurably improved patient morale and the will to live.

Seven years after the invention of the airplane by the Wright brothers in 1903, a plane had been built which could be used for transportation of patients. During World War I a few military patients were evacuated by small service planes. Many planes were successfully used as ambulances from time to time, but it was not until 1940 that military air evacuation was generally accepted as feasible.

The 38th Medical Air Ambulance Squadron was activated in May, 1942. Originally, aircraft were assigned solely for air evacuation purposes. It was soon realized, however, that transport aircraft used for the transportation of troops and supplies could also be utilized for the evacuation of patients.

In the Korean conflict, the mortality rates from wounds have been only about 50 per cent of those established in World War II. There are three definite factors to account for this gain: (1) antibiotics, (2) plasma and whole blood, and (3) widespread medical evacuation of patients by air.

On August 10, 1950 the commanding general of the Fifth Air Force directed the utilization of a helicopter for front-line medical air evacuation. Helicopters have been previously used for medical evacuation in field maneuvers, but this was the first time the helicopter was used during actual combat in the Korean conflict. The Marines utilized helicopters for medical evacuation in November, 1950, and the Army began to do likewise in January, 1951.

Due to the shortage of helicopters, only the most critically wounded were thus evacuated. Pilot pick-up is accomplished by land, flat-top, or LST based helicopters. The helicopter pilot, with a medical technician, goes behind the enemy lines, which often requires fighter cover for rescue of a downed pilot. Helicopters are attached to mobile surgical hospitals where the request for the lift of the patient is received. The patient is picked up from his front line position and evacuated back to the Mobile Surgical Hospital.

The 801st Medical Air Evacuation Squadron of the 315th Air Division (Combat Cargo) has evacuated by air 175,936 patients from the beginning of the Korean conflict through September 30, 1951. This figure does not include the actual number of lifts, since some patients are moved several times in Korea, from Korea to Japan, or from point to point in Japan. In the 6 month period from January through June, 1951, less than 1,300 patients were medically evacuated by hospital ship from Korea to Japan. In contrast, 36,835 were evacuated by air.

The advantages of air evacuation are many. Some of the advantages are morale, economy of time, economy of personnel, of material, of lives, of transporting equipment, and increased range and mobility of aircraft over surface transportation.

The safety factor need only be discussed from the standpoint of the patient's medical condition, since no patient has been injured in flight with combat cargo in a period of 12 months, during which time the flying was accomplished under extreme, and frequently hazardous, conditions. In a combat theatre, air evacuation of all types of cases is accomplished even if the risk is great.

There is no conclusive evidence that evacuation by air is 100 per cent contraindicated for a particular type of patient, or 100 per cent safe for another type. It is believed that any type of case can be transported by air, provided the plane is adequately equipped and medical personnel are well trained in the principles of aerotherapeutics. In the evacuation by air of 175,936 unselected cases of all types, the 801st Medical Air Evacuation Squadron has had a total of only 14 deaths in flight.

There seems to be little doubt that air evacuation will continue to grow by leaps and bounds, since air travel is the routine rather than the unusual means of military travel, and it appears to be only a matter of time until complete armies will be transported from one continent to another, or from one battle area to another.

The military commander supports air evacuation wholeheartedly since this plan provides him with large quantities of critical supplies and also relieves his organization of the burden of caring for the wounded in the front lines. Medical authorities endorse air evacuation because they like to provide casualties with comfortable transportation and adequate care in the shortest possible period of time. With numerous advantages and a few disadvantages, air evacuation of patients will undoubtedly replace in a large measure other means of transportation.

JOHN H. MOHARDT, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Brain Tumors in Children. ARTHUR B. SMITH. *Radiology*, 1952, 58: 688.

Approximately one-sixth of all brain tumors occur in children under 15 years of age. Of the author's group of 34 brain tumors in patients whose ages ranged from 11 months to 15 years, 19 were in children 6 years of age or younger. Most authors agree that two-thirds of the brain tumors in children occur beneath the tentorium. The majority of these are highly malignant. The cerebellar and fourth ventricle tumors, and tumors of the pons and medulla make up the group of subtentorial tumors. The medulloblastomas may arise from the roof of the fourth ventricle, vermis of the cerebellum, or posterior part of the middle of the cerebellum. The astrocytomas usually arise from one cerebellar hemisphere, but may take origin in the midline above the fourth ventricle. In many cases these tumors are cystic. The ependymomas arise from the walls and floor of the fourth ventricle. The tumors of the pons and medulla are most often highly malignant, infiltrating gliomas.

In the present group, the subtentorial tumors included 5 astrocytomas and 7 medulloblastomas, all of which arose in the cerebellum or the fourth ventricle. There were also 1 glioma, 1 hemangioma, and 2 unclassified tumors of the cerebellum, and 1 pinealoma, 2 ependymomas, and 4 unclassified tumors of the fourth ventricle.

There were 11 supratentorial tumors in the series; 5 were in the cerebrum, 2 in the frontal lobe, 1 in the temporal lobe, and 2 were not localized. Four of the 5 were astrocytomas and 1 was a glioblastoma multiforme. There were 3 tumors of the third ventricle and 1 in a lateral ventricle. A glioma which began in the eye and extended into the brain, and a spongioblastoma of the optic chiasm completed the group.

Two-thirds of the tumors which give clinical signs before puberty are below the tentorium. The diagnostic triad for an intracranial tumor in a child is vomiting, unsteadiness, and a positive Macewen's sign. There may also be severe suboccipital headache with pain and tenderness to percussion in this area, and enlargement of the head. Since the sutures of a child's skull are capable of separation, papilledema is often absent until late. The medulloblastomas are most common in males from 3 to 6 years of age. The cerebellar astrocytomas are benign, grow slowly, have a low surgical mortality, and do not recur if removed. They are usually partially cystic. They produce increased intracranial pressure with headache, vomiting, and choked discs. They are typically confined to one cerebellar hemisphere, and the signs of cerebellar dysfunction are primarily unilateral. The tumors of the pons and medulla usually involve the pons primarily. They produce extensive defects in action of the cranial nerves and cerebellar and pyramidal systems without evidence of papilledema or increased intracranial pressure. Most of the tumors are highly malignant, infiltrating gliomas, resistant to all forms of treatment, with a clinical course of only a few months before death. They are more common in females than males and tend to occur at from 6 to 12 years of age. Usually marked ataxia and inco-ordination appear after defects in the action of cranial nerves become noticeable. The tumors about the third ventricle all produce increased intracranial pressure, and treatment is generally unsatisfactory. In glioma of the optic chiasm, the most important sign is bilateral primary optic atrophy occurring in a child from 2 to 6 years of age. It may be associated with generalized neurofibromatosis.

X-ray examination was carried out in 31 of the 34 patients. In ventriculograms of 16 patients, dilated ventricles were found in 4 cases, all with subtentorial tumors. The diagnosis of a localized mass was made in 12 patients; in 3 cases the mass proved to be a supratentorial tumor, and in 9 cases, subtentorial. X-ray therapy was administered to 10 of the patients. Of these, 7 died, and 3, aged 10, 13, and 15 years, were improved. The tumors in these 3 cases were, respectively, a fourth ventricle medulloblastoma, an unclassified third ventricle tumor, and a cerebral glioblastoma multiforme with extensive calcification.

Twenty-five of the 34 children in this group were dead or unimproved at the end of a year and 9 were living and improved for more than 1 year. Of 11 with supratentorial tumors, 6 were dead or unimproved and 5 were improved. Of 23 with subtentorial tumors, 19 were unimproved or had died, and 4 were improved. The author's experience with 34 proved cases would indicate that the prognosis is worse in the younger age group, since medulloblastoma is more common in children of this age and the risk is greater. FRANK L. HUSSEY, M.D.

Experimental Cerebral Radionecrosis Produced by Contact Roentgen Therapy (La radionécrose cérébrale expérimentale provoquée par radiothérapie de contact). J. GUILLAUME, I. BETRAND, P. L. GÉRARD, and J. PECKER. *Presse méd.*, 1952, 60: 242

Gliomas of the hemispheres have been treated by radiotherapy during the last decade or so. However, the results were not very satisfactory, partly because of difficult accessibility and partly because of the danger of damaging normal cerebral tissue by higher doses of x-rays.

In order to determine the sensitivity of normal cerebral tissue to irradiation the authors experi-

mented on a series of rabbits. After trepanation, amounts of from 3,500 to 30,000 roentgens were applied by contact roentgen treatment to the frontoparietal field in one single dose. The animals were sacrificed after varying intervals of from 20 to 100 days, and the brain was examined histologically.

Severe necroses which were limited, however, to a narrow focus and to the parenchyma alone were observed after doses of more than 12,000 roentgens. When, however, the dosage surpassed 24,000 roentgens, the blood vessels were also involved in the necrotic process and the lesions went beyond the original zone of necrosis. In higher doses the necrosis was caused by the action on the blood vessels as well as by direct action on the brain parenchyma.

These findings suggest that roentgen therapy of gliomas of the hemispheres in man should be done with extreme caution, if at all. It is not yet known whether the radiosensitivity of the human brain is the same as or higher than that of the rabbit.

WERNER M. SOLMITZ, M.D.

The Roentgenogram of the Middle Lobe Syndrome (Das Roentgenbild des Mittellappensyndroms). K. H. WILLMANN. *Fortsch. Roentgenstrahl.*, 1952, 76: 346.

The lymphadenopathy which develops in the course of a tuberculous infection of the lung may cause a bronchial stenosis with subsequent atelectasis. This occurs either through compression or through inflammation of the bronchial wall with perforation and emptying of the node masses into the bronchus. This stenosis may disappear without any sequence for the bronchial system. However, in many cases a permanent obstruction of the bronchus remains with the subsequent development of bronchiectasis. This occurs with particular frequency in the middle lobe bronchus because of its anatomical position. The syndrome is very important because of its relative frequency and its confusion with bronchogenic carcinoma.

The enlargement of the hilus nodes may also be caused by nonspecific inflammations, a condition which Graham called "middle lobe syndrome."

It is important for the disease picture whether the lymphadenitis has a specific or nonspecific cause. The author emphasizes that by the term "middle lobe syndrome" is meant the secondarily inflamed changes in the middle lobe, such as pneumonitis, bronchiectasis, and abscess.

In the course of the last 2 years, the author observed at his clinic 23 patients with stenosis of the bronchus which had been caused by lymphadenopathy. In 19 cases the middle lobe was involved and only in 4 cases were other lobes involved. The clinical symptoms are pains in the chest, cough, and the bringing up of sputum. Each patient gave a history of long duration.

The x-ray examination is of great importance. Fluoroscopic study as well as roentgenography in various positions are mandatory. The density shows a wedged form, the peak of which is directed toward the hilus. Tomography is of no great value. By contrast, bronchography is of the greatest importance. It shows the stenosis in the diseased bronchus and, behind the stenosis, the bronchiectasis. Of course, the latter is not seen if the stenosis is complete.

Furthermore, the diagnosis may be ascertained by cytologic examinations as well as by bronchoscopy.

With regard to the differential diagnosis, bronchogenic carcinoma appears infrequently in the middle lobe; however, calcified lymph nodes suggest the middle lobe syndrome. However, it is almost impossible to differentiate exactly between bronchogenic carcinoma and the middle lobe syndrome. Therefore, at an advanced age (carcinoma age), it is advisable to perform an exploratory thoracotomy.

ERICH STRASSER, M.D.

The Roentgen Findings in Instances of "Digestive Megasplanchnica" (Roentgenbefunde bei der "digestiven Megasplanchie"). LUDOVIG FISCHER. *Fortsch. Roentgenstrahl.*, 1952, 76: 205.

The author is a roentgenologist at the Hospital "Santa Marta" in the city of Araguari, Brazil. This city is on the railroad northwest from Rio but far in the hinterland and the food here is neither too plentiful nor sufficiently varied. The author assumes that there is generally a deficiency of vitamin B_1. He thinks that such a deficiency may develop at times even among those who are economically able to provide for themselves a sufficient quantity and variety of food under normal circumstances, but might experience a deficiency while under special stress; thus, one of his patients first began to exhibit symptoms following the birth of her child.

The region concerned seems to be a sort of focal point for gastrointestinal disturbances, whatever their cause. The author as a radiologist, has, during the past 18 months, seen more than 100 cases of megaesophagus, of which all were roentgenologically determined to be on a functional basis except 3 which were on a mechanical basis. Of great interest in these cases of megaesophagus was the fact that in most of them a general roentgenologic examination of the gastrointestinal tract revealed a number of other dilatations or incipient dilatations of the tract.

There seemed to be no particular consistency in the location of these dilatations (megacolon, dilated stomach, enlarged duodenal cap) either in the time of their appearance, or in their relationship to one another. On the whole, the entire process resembled, more than anything else, some involvement of the neurosympathetic system. Anyhow, the extent of the changes observed suggests that the etiology is one involving the entire gastrointestinal system, the local effects being distributed much in the guise of those to be expected in an involvement of the sympathetic system.

A number of reproductions of roentgenograms are shown in the original article to illustrate the changes encountered in the material discussed.

JOHN W. BRENNAN, M.D.

Emergency Roentgenologic Examinations in Severe Hemorrhages of Gastroduodenal Origin (L'examen radiologique d'urgence dans les hémoragies graves d'origine gastro-duodénale). ÉMILE DELANNOY, P. GAUTIER, A. SOULIER, and G. LEMAITRE. *Presse méd.*, 1952, 60: 236.

The authors advocate the routine use of roentgenograms in all cases of acute severe hemorrhage of gastric or duodenal origin. Only by means of x-rays is it possible to determine the exact nature and location of the hemorrhage and to plan the best method of treatment. Some writers, especially in France, object against this procedure for numerous reasons. They state that it is dangerous, conducive to increased bleeding, and that the films obtained during a hemorrhage are difficult to interpret.

The writers reject these arguments. If necessary, a blood transfusion is done before the patient is placed on the x-ray table; with this precaution, the film is easily taken in any position desired. This does not take more than 15 minutes and the film is easy to interpret. Besides, the ingested barium acts beneficially rather than otherwise on the bleeding tendency. Being alkaline, it neutralizes the acidity and covers the bleeding surface with a plasterlike film. Finally, it is a well established fact that peristalsis is more marked and painful if the stomach and duodenum are kept quite empty. Moderate filling with barium has a soothing effect on the peristalsis.

A series of 13 cases is reported, and the roentgenograms are discussed. In 11 of these, it was possible to arrive at the correct diagnosis by means of the emergency roentgenogram.

WERNER M. SOLMITZ, M.D.

Vertebra Plana Totalis (Vertebra plana totalis). G. SCHMID. *Fortsch. Roentgenstrahl*, 1952, 76: 358.

The first description of congenital vertebra plana totalis may be traced to Putti (1910). Buchmann has already described 38 cases of isolated occurrence of vertebra plana in various locations.

The congenital "platysmolie" occurs mainly in conjunction with other vertebral anomalies. It is also described as a common finding in vertebra plana as well as being associated with the disturbance of lipoid metabolism and with nephrolithiasis.

One usually observes this disease in children between the ages of 2 and 13 years and predominantly of the male sex. The children complain of back pain. Frequently a kyphosis with lordosis develops and later also scoliosis as well as clubfoot, knock knees, and luxation of the hip joint. The child's growth is usually retarded as the muscle bone is decreased. Nothing in particular is known about the etiology and pathogenesis of this condition. Cleft palate, idiocy, and open hiatus sacralis are often present. Bone development is frequently retarded.

A short period of development is characteristic of true vertebra plana. It may be grouped with aseptic necrosis. Two stages are to be observed: (1) destruction and (2) reconstruction. The first symptoms are not characteristic and sometimes point to abdominal disease. Usually only one vertebra is diseased. Complete healing is not the rule.

The x-ray findings are as follows: in the early stages there is a slight decalcification. The intervertebral disc is usually of normal appearance. In the course of a few weeks there is a flattening of the body of the vertebra; complete decalcification follows; the diseased bodies have a flattened appearance in contrast to the intervertebral disc spaces which appear to be doubled or even tripled in height.

As was mentioned before, in addition to the congenital vertebral plana there is also an acquired type caused by trauma, infectious disease, or illness in the vicinity of the vertebra such as tuberculosis. This type is called the "Calvé syndrome." In these instances complete recovery is possible.

The case of a 6-year-old boy is described; he was 80 cm. tall and, according to his mother, was a normal child at birth. No history of infectious diseases or trauma was available. The subsequent examination gave no evidence of any abnormality except the described disease. Mental development was fully normal.

The x-ray film of the spine showed an extensive decrease in the height of all of the vertebra as well as a very large increase of the intervertebral disc spaces, an open hiatus sacralis, and an eighth cervical vertebra. Necrosis of both femur heads was also diagnosed.

To the author's knowledge, no similar case has been reported either in the German or the foreign literature. ERICH STRASSER, M.D.

MISCELLANEOUS

Genetic Aspects of Radiation Risks. ALMA HOWARD. *Brit. J. Radiol.*, 1952, 25: 177.

The need for a policy with regard to the amount of radiation permissible on medical grounds has long been recognized. More and more of the population are exposed to radiation so that when we consider the future of our species a policy on purely genetic grounds becomes increasingly urgent. The extensive work done on radiation-induced mutations in animals has indicated that radiation results merely in speeding up of the spontaneous mutation rate, not in the production of anything qualitatively different. At the present stage of our knowledge we can say that under irradiation the same mutations appear, though far more frequently and in the same proportions, as those observed to arise spontaneously. It has generally been concluded, for purposes of argument, that the spontaneous mutation rate in man is similar to that in Drosophilia, namely 1 in 100,000 per gene per generation.

A large amount of experimental work in radiation-induced mutation has indicated that the number of mutations produced bears a linear relationship to the dose and is independent of the type of ionizing radiation and of the dose rate. However, it is not certain that this linear proportionality extends to very low dose rates, and recent work in which 2 to 5

roentgens per day of gamma radiation was given to Drosophilia indicates that at this low level there may be some recovery process on the part of the gene, which results in less frequent mutation than was expected. Thus, if a dose of 100 roentgens, which if received in a short time would undoubtedly give rise to appreciable mutation, was received at the rate of 0.1 roentgen per week, its effect might be very much less. The outcome of this procedure is one of very great theoretical importance. Its practical significance for the problem of genetic radiation risk in human populations is also great when we are faced with the possibility that large numbers of people may be exposed to very small but continuous doses of radiation due to the presence of radioactive waste in drinking water or in the atmosphere.

When we try to foresee the results of whatever policy we now adopt (or which circumstances may force upon us), we are at every turn handicapped, or even disabled, by lack of quantitative knowledge. We need information on every question relevant to human genetics, population behavior, and reproduction biology. FRANK L. HUSSEY, M.D.

The Hemorrhagic Phase of the Acute Radiation Syndrome Due to Exposure of the Whole Body to Penetrating Ionizing Radiation. E. P. CRONKITE, G. J. JACOBS, GEORGE BRECHER, and GEORGE DILLARD. *Am. J. Roentg.*, 1952, 67: 796.

Hemorrhage following irradiation in the lethal range has long been established and known as a prominent cause of death. The importance of the hemorrhagic phase of irradiation injury is illustrated by the Report of the Joint Commission for the Study of the Atomic Bomb Casualties in Japan. In the severe cases, hemorrhage of one type or another was prominent. Generalized purpura was common. Ulcerative gingivitis with bleeding was frequent. The laboratory findings in the Japanese patients with a hemorrhagic state were as follows: (1) consistent thrombocytopenia and poor clot retraction, (2) consistent increase of the bleeding and clotting time, and (3) sporadic increase in the capillary fragility.

In this report, the pathogenesis of the hemorrhagic state was approached by analysis of the current knowledge and presenting data in various phases of the known hemostatic mechanisms in the dog.

Ulceronecrotic lesions and infections play a prominent role in initiating hemorrhage. Once hemorrhage is initiated, the thrombopenic animal has difficulty in stopping the outflow of blood from eroded vessels.

There is no evidence for failure of the supporting structures of the blood vessels except when there are ulcerations into the vessels. Hemorrhage from this type of lesion is most prominent when there is motility that interferes with hemostasis, as in hollow viscera. Further, bleeding is prevalent in the hemorrhagic state when there is little resistance of the local tissue to the outflow of blood.

The factor precipitating purpura is unknown. All thrombopenic animals do not become purpuric. It it known that diffuse purpura is frequently associated with sepsis.

There is no positive evidence for a deficiency of any of the plasma factors essential for blood coagulation except those connected with the platelet. At present, the defects in hemostasis of the irradiated animal can apparently be explained by the thrombopenia and its sequelae. The blood coagulation defect and the failure to utilize prothrombin can be directly correlated with the platelets. However, it is necessary to increase the platelet level of the thrombopenic dog to a much higher level than would be expected to obtain results equivalent to those in in vitro studies.

Because of the diffuse character of irradiation injury and the complexity of hemostasis, it is best to keep an open mind concerning the mechanism of the acute irradiation syndrome. Hemostatic factors, as yet poorly defined, may possibly prove to be defective. EDWARD D. HUDACK, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Why Are the Antibiotics Ineffective Against Viral Infections? (Pour quelles raisons les antibiotiques n'agissent-ila pas sur les ultravirus?) C. LEVADITI. *Presse méd.*, 1952, 60: 133.

Bacteria and rickettsia both have enzyme systems which are necessary for multiplication and growth. The author, therefore, believes that it is plausible that certain antibiotic systems are effective against both of these groups of agents.

Viruses, however, have no enzymatic properties. They use the enzyme systems of the cell of the host for their multiplication. For this reason it, again, seems plausible that antibiotics which are effective against bacterial and rickettsial infections will not, as a rule, show activity against viral infections.

GERTRUDE J. VAN ECK, M.D.

The Behavior of Lysoenzymes in the Blood Serum of Patients Suffering from Neoplasms (L'Attivita lisozimica del siero di sangue di portatori di neoplasie). MARIO FIORE. *Tumori*, Milano, 1952, 38:47.

The author presents in detail and with full page tables some interesting findings of his studies. He states that lysoenzymic changes in the blood serum occur as follows:

1. The lysoenzymes are diminished considerably in patients with sarcoma, much more so than in patients who have carcinoma of the breast or stomach. They are not very much diminished in Hodgkin's disease, but they are increased in patients with lymphosarcoma and reticulosarcoma. In patients with myxosarcoma and in those with benign tumors the lysoenzymes remain practically normal.

2. The lysoenzyme activity in the blood serum of patients with tumors is not similar to that in patients who are suffering from vitamin deficiency diseases, but in patients with carcinomatous metastases this activity is less than in patients who do not have metastases.

3. The following hypothesis is presented: vitamin A deficiency in patients with cancer may be the reason for this particular type of activity of the lysoenzymes in the blood serum.

ANTHONY PINO, M.D.

Plasmocytoma (Multiple Myeloma) and Trauma (Plasmocytom [multiples Myelom] und Trauma). ALBERT K. SCHMAUSS. *Chirurg*, 1952, 3:115.

A 22-year-old farm laborer who, during the Second World War (August, 1944), received a shotgun wound which produced a bilateral fracture of the lower jaw, represents the first of the 2 cases reported. He was 19 years of age at the time of his injury. Three years later he began to suffer from lancinating pains in the chest region, and later in the legs. Seven months later a spontaneous fracture of the left femoral neck occurred. Roentgen examination of the entire skeleton now disclosed multiple myeloma, and biopsy excision from the left trochanteric region substantiated the diagnosis of plasmocytoma. (Apitz proposed the term plasmocytoma for this tumor, in consideration of the fact that it is always composed of myeloic plasma cells and their immature precursors.)

The patient died 2 years after the first spontaneous fracture, and his relatives applied for accident insurance compensation. Since the work of Apitz was not at that time available, the application was denied.

The second case was that of a 45-year-old patient who, in 1943, received a pistol shot wound of the fifth lumbar vertebra with fracture of the left transverse process of the fourth lumbar vertebra. Five years later he began to suffer from lancinating pains in the sacral region. The pyelogram disclosed a large filling defect of the right kidney and, in addition to the residua of the pistol shot wound, a wedge-like collapse of the body of the first lumbar vertebra. The urine contained albumin and erythrocytes.

The kidney was removed under the diagnosis of right renal hypernephroma. The removed kidney, however, afforded no evidence of hypernephroma; there were simply areas of renal canalicular obliteration and retention of inspissated albumin in the canaliculi.

Postoperatively, a Bence-Jones body was identified, the level of the serum albumin was elevated to 9.16 mgm. per cent, and the roentgen examination of the entire skeleton disclosed multiple myeloma. A few weeks later the patient died of uremia and his wife applied for compensation. In this instance, again, the application was rejected because the opinion of the medicolegal expert had always been that multiple myeloma represents a stroke of fate, without relationship to traumatic etiology.

Since the pathologicoanatomic studies of Apitz and the clinical studies of the bone marrow of patients with multiple myeloma by Rohr, Fleischkacher, and Klima, the author has come to hold the opinion that the 2 reported instances were in all probability the result of the war injuries.

JOHN W. BRENNAN, M.D.

Anatomic Studies of the Liver, the Kidneys, and the Pancreas in Postoperative Fatalities. Contribution to the Study of the Hepatorenal Syndrome (Anatomische Untersuchungen von Leber, Niere und Pankreas bei postoperativen Todesfaellen. Zugleich ein Beitrag zum "hepatorenalen Syndrom"). F. HARTL. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 121.

A systematic study of the organs important for metabolic processes was made by the author in post-

mortem examinations of 378 patients who succumbed to the operation not earlier than 8 days after the procedure.

Changes of the liver parenchyma could be divided into 4 groups:

1. Central, mostly diffuse fatty degeneration, cloudy swelling, and central hyperemia.

2. The same conditions and degenerative cellular changes in the central zones of the liver lobules.

3. Central, mostly pericapillary fatty degeneration, and more marked dissociation of the parenchymatous cells with signs of necrobiosis.

4. Pericapillary edema, central dissociation, sudanophobe vacuoles, capillary hyperemia, and central necrosis of the lobules.

In the majority of cases, changes belonging to the first two groups were found. They may be interpreted as transient dystrophy of central portions of the liver lobules. Lesions of the second, third, and fourth groups represent hypoxemic parenchymatous changes.

Advanced changes in the liver nearly always lead to renal lesions, namely glomerulonephrosis or tubulonephrosis. Similar relations may be found between fatty degeneration of the liver and the pancreas.

Disregarding the age or the sex of the patients and the cause of death, the author found that the majority of the postoperative fatalities occurred in the pycnic type of body formation.

JOSEPH K. NARAT, M.D.

EXPERIMENTAL SURGERY

The Thrombin Degradation Test According to Lenggenhager. Clinical and Experimental Studies (Zur Thrombinabbauprobe nach Lenggenhager. Klinische Erfahrungen und experimentelle Untersuchungen). P. SEULBERGER and H. PETERS. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 42.

The technically rather simple thrombin degradation test belongs to the group of laboratory procedures used for coagulation-time determination. Its goal is to enable the clinician to recognize thromboembolic phenomena in their beginning. However, it became evident that the reaction could be influenced by various factors and that the values obtained with the usual tests were more constant. Therefore, and in spite of the lesser cost and technical simplicity, most of the institutions did not accept the Lenggenhager test as a routine procedure.

The authors found it worth while to investigate clinically as well as experimentally the value of the thrombin degradation test and by these means, furthermore, expect to obtain additional information regarding the action of antithrombin. They present an extensive analysis of the various factors influencing the reaction and submit an extremely detailed statistical material in support of their study.

Age, sex, psychic changes, and disease appear to modify the reaction. The last-mentioned factor is the most important one. However, it remains a fact that the existence of thrombotic changes results in the reduction of the coagulation time, a condition which can be reversed by the use of anticoagulants. The normal average value was approximately 77 seconds, but individuals under 20 years of age were recorded to have a shorter coagulation time. The highest normal values were encountered in persons between 20 and 40 years of age. These variations became less evident in case of disease. The opinion of Lenggenhager, that a coagulation time below 35 seconds would establish the diagnosis of thrombosis, could not be corroborated since values over 35 seconds were registered in many persons suffering from thrombosis.

The authors recommend the simultaneous determination of the coagulation time by several methods in order to obtain more precise values, since all methods are subject to some error.

R. SCHOBINGER VON SCHOWINGEN, M.D.

Experimental Studies on Animals Regarding the Circulatory Action of the Synthetic Anticoagulant, Thrombocid (Tierexperimentelle Untersuchungen zur Kreislaufwirkung des synthetischen Anticoagulans Thrombocid). JOSEF KONCZ and EMIL BUECHERL. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 27.

The new synthetic drug "thrombocid" appears to have great chemical and physiological resemblance to heparin. Thrombocid has a multiple action. It inhibits the activity of thrombokinase, decreases the number of platelets, and blocks (in combination with a plasma factor) the transformation of prothrombin into thrombin. The new substance was found to possess antithrombinlike properties as well as a pronounced fibrolytic action which is believed to be the indirect consequence of the mobilization of body phosphatides. Furthermore, the administration of thrombocid was followed by vasodilatation.

The authors investigated the pharmacodynamic properties of thrombocid after its injection into the arterial and venous blood stream, and describe in detail the experimental procedure. The studies were carried out on 11 dogs. Two control animals failed to show any changes in their peripheral circulation after the injection of the new drug. The remaining 9 dogs were brought into adequate experimental conditions by a 25 per cent reduction of their blood volume. Eight of these animals presented circulatory changes of various degrees after the administration of thrombocid which were characterized by an increased blood flow in the tested areas (extremities and portal system).

The physiopathological modifications which occur in case of thrombosis consist mainly of the purely mechanical obstruction of the circulation by the thrombus and of a spastic reflex contraction of the veins and arteries which are not directly affected by the thrombotic process. Since the administration of thrombocid brought rapid disappearance of these symptoms it was logical to conclude that the new drug was able to induce vasodilatation. Hence, the

authors could register a 50 to 80 per cent increase in the blood flow after the intravenous injection of thrombocid. This favorable change occurred only if the vessels were in a state of increased tonicity, and lasted an average of 30 minutes. The intra-arterial injection of the drug revealed the site of impact of the thrombocid in the arteriolar portion of the vascular system. Thrombocid may, because of its pharmacodynamic properties, be considered a sympathicolytic drug, however, without the typical adrenalin-inhibitory action of such a substance.

R. SCHOBINGER VON SCHOWINGEN, M.D.

Studies on the Vasculoactive Component of Thrombocid (Untersuchungen ueber den Wirkungsmechanismus der kreislaufaktiven Thrombocidkomponente). EMIL BUECHERL and JOSEF KONCZ. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 271: 36.

The authors had during their previous experimental studies observed that the administration of the new anticoagulant "thrombocid" was followed by an increase in the blood flow. This, however, occurred only in the presence of an augmented vascular tonicity. The tonus of the blood vessels was experimentally elevated by decreasing the blood volume. The authors' previous investigations had, furthermore, revealed that the site of impact of the drug was located at the periphery of the cardiovascular system. The question as to what degree the vascular innervation was responsible for the vasodilatation remained unsolved. Also, it was not entirely clear whether the vessels of the skin, those of the musculature, or those of both vascular systems took part in the process of vasodilatation. These problems, as well as the action of thrombocid upon the oxygen consumption of the inactive skeletal muscle, were investigated and the results were submitted in the present article.

By means of a rather complicated procedure which was described in detail, it was possible to transfuse, against variable resistances, a certain amount of blood per minute from a donor dog to a second dog. In order to realize the optimal experimental conditions for the study of the afore-mentioned problems, one posterior leg of the receiving dog was completely isolated from the rest of the body with the exception of a triple nerve connection (ischiadic, femoral, and obturator). The blood reached the isolated leg through glass tubes located in the femoral artery and vein. When desired, it was possible to add from 1 to 3 c.c. of thrombocid to the transfused blood, generally in a period of 2 to 3 minutes each time.

An unexplained drop in the blood pressure in the isolated leg followed the onset of the blood transfusion and it was necessary to wait at least 20 minutes until the pressure in the leg returned to the level of the systemic pressure. The injection of thrombocid resulted in a marked initial lowering of the blood pressure in the isolated leg. This drop in pressure, which was only of short duration and probably due to the acid *p*H of thrombocid, was then followed by a more important and progressive decrease of the arterial pressure which reached its lowest point at the end of approximately 25 minutes. The return to normal values required a rather long period of time.

The absence of any experimentally significant changes in the oxygen concentration of the arterial or venous blood indicates that the capillaries do not participate in the process of vasodilatation. The lowering of the blood pressure is most probably due to the dilatation of the arterioles, the muscular layer of which is believed to be the direct site of impact of the drug. There was no difference in the obtained values whether the nerve communications between the isolated limb and the body of the animal were transsected or not.

R. SCHOBINGER VON SCHOWINGEN, M.D.

Experimental Ascites; Its Production and Control. JACOB K. BERMAN and JAMES E. HULL. *Surgery*, 1952, 32: 67.

Ascites has been produced in experimental animals by incomplete ligation with a polythene band of the inferior vena cava above the diaphragm. The animals produced about 2,000 to 3,000 c.c. of ascitic fluid every 2 weeks. The fluid was straw-colored, with a specific gravity of 1.016. It contained 1.4 gm. per cent of globulin, 1.8 gm. per cent of albumin, 122 milliequivalents of chlorides per liter, 157.8 milliequivalents of sodium per liter, and 4.3 milliequivalents of potassium per liter. There were 600 red cells per cubic millimeter and 2,000 white cells, all of which were polymorphonuclears. The portal pressure was higher than that of normal dogs, ranging from 220 to 245 mm. of citrate solution.

The treatment of experimental ascites is based on dietary and pressure control. The combination of these 2 methods is superior to either method alone. Patients with advanced portal cirrhosis and ascites (who are treated by hepatic, splenic, and left gastric arterial ligation) are less likely to produce ascitic fluid in the immediate postoperative period if they are kept on a low sodium (1.5 gm. per day) and high protein diet.

Passive hyperemic cirrhosis, due to cardiac inadequacy, may be accompanied by the production of small amounts of ascites after ligations, dietary control, and cation-anion resins. It is best treated by removing small amounts of the fluid at frequent intervals rather than a large quantity at one time.

SAMUEL KAHN, M.D.

General Review of Sheehan's Syndrome (Syndrome de Sheehan. Revue générale). J. LENG-LEVY and R. BURLAUD. *J. méd. Bordeaux*, 1952, 129: 364.

The authors present a comprehensive review of Sheehan's syndrome which was first described in 1937 (necrosis of the anterior lobe of the pituitary occurring during delivery or shortly postpartum). The history and relation of Simmond's disease to this entity are thoroughly reviewed. All aspects of insufficiency of the anterior lobe of the hypophysis

in the partum or postpartum period, complicated by shock, hemorrhage, toxemia, or infection, are discussed.

The pathogenesis is not clear. The local lesion appears to be due to an ischemic infarct caused by thrombosis of the vessels of the hypophysis. It is thought to be an embolic phenomenon from the pelvic area or perhaps a local vascular spasm in the hypophyseal vessels. Some think there is an inherent weakness in a hypophysis so affected. The roles of the various endocrines in augmenting or abating the functions of the anterior lobe of the hypophysis are discussed, and, in turn, the effect of the altered function of the hypophysis on the other endocrine organs is considered.

The usual clinical picture in this syndrome is that of a pregnant woman of no certain age, a primipara or multipara with a history of some previous menstrual abnormalities, who has a delivery complicated with hemorrhage, shock, or infection. This is usually followed by hypoglycemia (rarely convulsions) and then perhaps scarcity or absence of lactation. The more marked the shock or hemorrhage, the more marked are the symptoms. Other symptoms begin to manifest themselves later in the patients who survive, such as loss of secondary sex characteristics, loss of muscle power, asthenia, and cachexia.

Changes in blood chemistries occur in the glucose, cholesterol, potassium, and total protein levels. The blood sugar is decreased. Cholesterol and potassium are said to be both elevated and depressed. The total proteins are slightly decreased. There may be an anemia, and occasionally an eosinophilia in those showing adrenal exhaustion. The only constant sign is a reduction in blood sugar. Urine changes are found only with a decrease in gonadotropic hormones, 17-ketosteroids, and 11-oxysteroids. The basal metabolic rate may be found to be as low as minus 30 to 50.

Treatment for this syndrome entails the transplantation of either human or calf hypophysial tissue, or endocrine replacement therapy. A new pregnancy is thought to be of some beneficial effect. Transplants have been tried with equivocal results. In actual practice, the treatment has been that of substitution therapy. Gonadotropic hormone has brought no definitive improvement. Corticotropic hormones have had some effect. Thyreotropic hormone is not well tolerated. Desoxycorticosterone produces little amelioration of the symptoms, and water retention and facial edema occur easily. Estrogens may have an effect. Androgens seem to give the best results. They are given as testosterone by intramuscular injection, implantation, or sublingually.

The injected dose is from 100 to 130 mgm. daily, the implantation dose from 400 to 600 mgm. and the sublingual dose from 15 to 30 mgm. daily. Six patients treated with androgens by Simpson were reported as cured. There was no virilization. The most marked effect occurs in the general state of well being, with a return of muscular energy, libido, and sex characteristics. The authors conclude that this syndrome is rare but not exceptionally so, and that the histology, biology, and the effect of therapeutic substitution of hormone confirm the concepts of the hypophysial origin of the syndrome of Sheehan.

MARY M. MARTIN, M.D.

SUBJECT INDEX—ABSTRACTS—VOLUME 95

ABDOMEN, Open omphalomesenteric duct, 29; torsion, infarction, and hemorrhage of omentum as cause of acute distress of, 43; 127 penetrating wounds of, 44; ruptured endometrial cysts as cause of acute abdominal symptoms (endometrial pelviperitonitis), 45; recent advances in surgery of inguinal hernia, 130; formation of inclusion dermoid cysts following whole-thickness skin-graft repair of hernia, 140; results of primary inguinal hernioplasty, 140; congenital enteroumbilical fistula due to patent vitelline duct, 140; trauma as factor in inguinal hernia, 251; femoral hernia, 251; pericolic membranes, appendicitis, and pseudoappendicitis, 256; nonpenetrating trauma of, with reference to lesions of duodenum and pancreas, 264; intestinal obstruction; physiopathology, diagnosis, and treatment, 347; use of tantalum wire and mesh for plastic repair of, 457; mesenteric thrombosis following blunt trauma of, 555; wounds of, in jungle warfare, 565

Abducens nerve, Paresis of, following spinal anesthesia, 400

Abnormalities, Pregnancy associated with congenital, of female reproductive tract, 481

Abortion, Habitual, 53; trends in therapeutic; review of 137 cases, 53; do attempts at, lead to deformities, 486

Abscess, Treatment of residual pulmonary cavities after, 17; embolic liver, following acute appendicitis, 36; combined surgery and chemotherapy of abscesses in bone and joint tuberculosis; early results, 500; surgical interventions on paravertebral tuberculous, 500; treatment of, associated with spinal tuberculosis, 580

Acacia, Plasma expanders; collective review, 521

Acetabulum, Intrapelvic prominences of floor of hip socket in adults, with special discussion of protrusion of, 73

Achlorhydria following gastric resection, 460

Actinomycosis, Treatment of cervicofacial, with regard to penicillin therapy, 239

Adamantinoma, 231

Adenocarcinoma, Of endometrium; clinicopathologic study, 475; primary, of cervix, 567

Adenochondroma, Five cases of, of lung, 128

Adenoma, Bronchial, treated by local resection and reconstruction of left main bronchus, 128; bronchial; polypoid tumors of slow evolution, 335; so-called bronchial, are epitheliomas with modified stroma; indications of bronchial tumor with myoepithelial cells, 336; carcinoma arising in, of colon and rectum, 349; bronchial, 449; islet cell, of pancreas, 563

Adrenalectomy, Bilateral total, in malignant hypertension and chronic nephritis; preliminary report, 488

Adrenal gland, Surgical treatment of hyperfunctioning lesions of, 175; retropneumoperitoneum applied to study of, 202; negative benzodioxane test in presence of pheochromocytoma, 279; carcinoma of cortex of, with endocrine manifestations, 279; functional evaluation of cortex of, in newborn, 311; mixed disease of, in infancy, 367; pheochromocytoma; diagnosis and treatment, 367; carcinoma of cortex of, in children, 367; pheochromocytoma; case report of successful thoracoabdominal operation after 9 negative surgical explorations, 487; surgery of, 487

Adrenocorticotrophic hormone (ACTH), Effect of donor skin desensitization and, on survival of skin homografts in rabbits, 94; effect of, on autogenous and homologous skin grafts in rabbits, 208; effect of, on survival of homografts, 404; surgical use of, and cortisone, 517

Air evacuation, Medical, in Korea and its influence on future, 591

Alcohol, Placental blood plus, introduced as transfusion therapy in Poland, 503

Alkalosis, Postoperative potassium deficit and metabolic; pathogenic significance of operative trauma and of potassium and phosphorus deprivation, 507

Allergy, Aural manifestations of, 325

Aluminum gels with constant phosphorus intake for control of renal phosphatic calculi, 491

Alveolus, Treatment of tumors of inferior, and mandible, 427; tumor of, of lung, 448

Amenorrhea, Endocrine therapy in treatment of functional, and functional oligohypomenorrhea, 270

Amines, Experimental study of cancerogenic potency of aromatic amines, 206

Ammonia, Role of reabsorption of, in acid-base imbalance following ureterosigmoidostomy, 62

Amniotic fluid, Study of circulation of, in man, 173; nonfatal case of embolism of, 365

Amputees, Rehabilitation of, 81

Amylase, Serum levels of, in experimental pancreatitis, 357

Anemia, Disappearance of tetany and, after resection of blind loop of intestine, 146; etiopathogenesis of, in diaphragmatic hernia of stomach, 252

Anesthesia, Preliminary report on use of methonium compounds and general, in ophthalmic surgery, 5; extradural spinal, according to Buchholz and Lesse in urologic operations and comparison of its results with those of peridural, 67; physiological trespass in, 193; artificial hibernation, 194; artificial hibernation; new practical details and latest results, 194; by controlled inhibition of autonomic nervous system, 194; techniques in pediatric; nonrebreathing method, 195; experiences in use of general, for corrective rhinoplasty, 195; present position of, for thoracic surgery, 195; T-piece technique for general inhalational, 196; prevention of headache following spinal; use of epidural saline; preliminary report, 196; modern trends in obstetrical, 275; cardiac arrest, 297; chemical, histopathological, and electroencephalographic basis of dynamic theory of general, 298; considerations of controlled hypotension in course of, 300; bloodless surgery by means of controlled circulation, 300; for long or technically difficult ophthalmologic and otolaryngologic surgical procedures, 301; circulatory factors affecting, in surgery for congenital heart disease, 301; metabolic effects of, in man, 302; general, in open thorax surgery, 399; paresis of abducens nerve following spinal, 400; pharmacologic study of new analgesic, dihydrone pectinate, in human and veterinary medicine, 401; estensive necrosis of skin and subcutaneous tissue after local, with usual novocain-adrenalin solution, 401; place of leather-soled shoes in prevention of explosions during, 401; for surgical correction of cardiorespiratory anomalies, 402; preparation for bronchiography and local, of bronchial tree, 442; continuous caudal, in labor, 483

Aneurysms, Treatment of, of aorta by wrapping them with polythene cellophane; 2 personal observations, 22; intrasaccular wiring of abdominoarteriosclerotic aortic, by Pack method, 84; vein inlay graft in treatment of, and thrombosis of abdominal aorta, 85; accidental incision of, of left common carotid artery, 87; electroencephalographic observations in cases of, and arteriovenous fistula of head and neck, 293; use of preserved

infant's aorta in treatment of popliteal, 294; surgical treatment of arteriosclerotic, of abdominal aorta, 294; traumatic arteriovenous fistulas and, in war wounded, 388; carotid-cavernous, 547; surgical considerations of intrathoracic, of aorta and great vessels, 552; nontraumatic arterial, of extremities, 588
Angiography, Possibilities of, of liver; visualization of portal system, 201
Ankle, Arthrodesis of, by springs, 77; fractures of, 501; traumatic necrosis of talus, 581
Anomalies, Congenital, of aortic arch, 133; congenital osseous, of carpus; synostosis congenita bilaterale of semilunar and pyramidal bones, 377; anesthesia for surgical correction of cardiorespiratory, 402
Anosigmoidoscopy, Value of routine, as diagnostic procedure in general practice, 154
Anoxia, Congenital malformations of eye induced in mice by maternal, 232; fetal, 484
Antibiotics, Toxic suppuration of lungs and endobronchial therapy with, 335; chemotherapy and, in surgical infections, 398; sulfonamides and, in trachoma, 429; bacteria of ocular flora producing, 429; treatment of postirradiation infection with; experimental study on mice, 516; why are, ineffective against viral infections, 597
Antitoxin, Serum polyneuritis following tetanus, with unusual localization of paralysis and late injury, 399
Anus, Granulomatous lesions of region of, and rectum, 38; canal of, and rectum, 153; surgical management of congenital malformations of, and rectum, 153; value of routine anosigmoidoscopy as diagnostic procedure in general practice, 154; construction of rectal sphincter and restoration of continence by transplanting gracilis muscle, 562
Aorta, Treatment of aneurysms of, by wrapping them with polythene cellophane; 2 personal observations, 22; intrasaccular wiring of abdominoarteriosclerotic aneurysms of, by Pack method, 84; vein inlay graft in treatment of aneurysms and thrombosis of abdominal, 85; congenital anomalies of arch of, 133; double arch of, 133; laceration of, 134; use of preserved infant's, in treatment of popliteal aneurysm, 294; surgical treatment of arteriosclerotic aneurysms of abdominal, 294; thoracic aortography; its value in patent ductus arteriosus and coarctation of, 303; unusual variant of double arch of, 340; surgical treatment of stenosis of, 340; thrombotic occlusion of, as demonstrated by translumbar aortograms, 406; surgical considerations of intrathoracic aneurysms of, and great vessels, 552
Aortography, Direct and retrograde, 84
Apicolysis, Actual status of extrafascial, in surgical treatment of pulmonary tuberculosis, 443
Appendicitis, In childhood, 35; embolic liver abscess following acute, 36; results obtained in treatment of acute, 152; pericolic membranes, pseudoappendicitis and, 256; biometeorologic effect on genesis of, 348; acute, in infants, 462; during first 2 years of life, 462
Arm, Nonthrombotic obstruction of venous circulation of upper; therapeutic value of venoclysis and perivenous sympathectomy; Paget-Schroetter's syndrome, 389; radiohumeral synovitis, 497
Arteries, Physiology and relief of traumatic spasm of, 86; bronchial; their role in pulmonary embolism and infarction, 127; malignant hypertension with unilateral occlusion of renal, 175; collateral circulation following ligation of right subclavian, 187; regional heparinization after thromboendarteriectomy in treatment of obliterative disease of, 188; ligation of common hepatic, in treatment of cirrhosis; first personal results, 258; motor innervation of large, 293; experimental studies with transfusion into, 296; translumbar arteriography; its roentgenologic interpretation, 306; case of isolated congenital stenosis of pulmonary, 340; use of tubes constructed from vinyon "N" cloth in bridging defects in, 391; further observations on use of temporary polythene shunts and frozen homologous graft replacement of major segments of, in traumatic and malignancy surgery, 391; preservation of grafts of, by freezing, 392; factors influencing filling of anterior cerebral, in arteriography, 405; medical and surgical treatment of permanent hypertension of, 439; cystic pulmonary sequestration with abnormal, of aortic origin; 6 case reports, 442; experimental studies regarding ligature of hepatic, and anastomosis between hepatic, and portal vein, 467; supply of blood to male urinary bladder, 493; early results following therapeutic ligation of hepatic, 562; endarteriectomy, or surgical restoration of lumen of obstructed, in arteriosclerosis obliterans, 588; heterogeneous grafts of, 588
Arteriography, Technique of translumbar, 86
Arteriosclerosis obliterans, Role of sympathectomy in, 188; endarteriectomy, or surgical restoration of lumen of obstructed artery in, 588
Arthritis, Rehabilitation of hand function in rheumatoid, 510
Arthroplasty, Fascial, of knee, 184
Ascites, Experimental; its production and control, 599
Ascitic fluid, Plasma expanders; collective review, 521
Asphyxia, Of newborn, 55; pathology of fetal and neonatal, 483
Aspiration and pneumonia due to, 591
Atabrine Use of sodium fluorescein and, in diagnosis of tumors, 205
Atomic warfare, Mass treatment of burns in, 397
Audiology, Symposium on, 6
Auditory canal, Congenital atresia of; two-stage operation with fenestration, 235
Aureomycin, Terramycin and, in surgical infections; report of 200 cases, 509

BACK, Lame; some common causes and conservative treatment, 72
Ballistocardiogram in constrictive pericarditis before and after pericardiectomy, 23
Banthine, Treatment of experimental acute pancreatitis with, 357
Bile, Nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209; lipid constituents of normal, 260
Bile ducts, Experimental use of free arterial and split-thickness skin grafts for bridging defects in common, of dog, 42; substitution of extrahepatic, with polyethylene tubes, 43; recurrent cancer of common, and periampullary region, 159; fibrotic stenosis of terminal common, 261; treatment of choledochoduodenal fistulas due to ulcer, 353; liver protection therapy in operations on, 353; compressions of common, by chronic pancreatitis, 468
Biliary tract, Manometric and roentgenologic control of, during operation, 155; indications and newer technique in primary surgery of (excepting tumors), 155; injection into canal of Wirsung in course of cholangiography, 158; spontaneous internal biliobiliary fistulas, 158; recurrent cancer of common bile duct and periampullary region, 159; regulated right hepatectomy, 258; spontaneous internal fistulas of, of ulcerous origin, 260; fibrotic stenosis of terminal common duct, 261; management of acute disorders of, 261; nonsurgical diagnosis of postcholecystectomy syndromes, 352; recurring calculi following cholecystectomy, 467; possi-

bilities and limitations of chemical and pharmacodynamic methods to relieve obstruction of main, 468; value of cholangiograms during surgery of, 468

Biopsy, Contribution to study of cancers of uterine corpus; value of suction, in their diagnosis; report of 33 cases, 164

Bladder, Indications for neurosurgical establishment of automaticity of, in paraplegia, 62; enterocystoplasty for small, after nephrectomy for tuberculosis, 63; diseases of prostate and; present day management, 178; etiology of purpura of, and of renal pelvis; apoplexy of urinary, and of renal pelvis, 279; surgery of diverticulum of urinary, 280; vesicovaginal fistulas, 360; cystectomy in invasive-infiltrative papillomatosis of urinary, and of juxtavesical portions of ureters, 368; new concept concerning treatment of exstrophy of, 371; roentgenographic signs of tumor infiltration of wall of urinary, 409; arterial supply of male urinary, 493; discussion on treatment of carcinoma of 493; trigonal cystectomy, 574

Blastomycosis, Pulmonary resection and undecylenic acid in systemic, 446

Blood, Variations of coagulation time of heparinized plasma following delivery, 54; level of prothrombinemia and thromboplastic factors following delivery, 55; fatal transfusion reactions from massive bacterial contamination of, 89; importance of volume studies of, in management of surgical patients, 91; shock therapy with intraperitoneal infusion of volume replenishers of; dextran and PVP, 92; mechanism of coagulation of; historical review and outline of modern concepts; collective review, 105; relations between prothrombin time and thromboplastin time after splenectomy; experimental and clinical study, 162; fluctuations in number of eosinophils in, during postoperative period, 192; practical experiences with interruption of pregnancy and sterilization in familial erythroblastosis, 273; antenatal prediction of hemolytic disease of newborn, 277; treatment of hemolytic disease of newborn, 277; hematological changes in patients with congenital cyanotic heart disease who have been subjected to operations designed to improve circulation to lungs, 337; intravascular agglutination and vascular stasis in peptic ulceration, 346; reviews and considerations of coagulation of, in portal hypertensives subjected to splenorenal anastomosis, 358; splenectomy; indications and technique, 358; increase of postoperative thrombosis and embolism and their management with anticoagulants, 362; disturbances of coagulation of, in cases of severe premature separation of placenta, 363; diagnosis and treatment of hemolytic disease of newborn, 364; results of treatment of hemolytic disease of newborn, 365; clinical review of thrombocid, synthetic heparin, in obstetrics and gynecology, 366; new method in treatment of hematogenous osteomyelitis, 387; treatment and prophylaxis of thrombosis and embolism with dicumacyl; problems and results, 396; effect of dextran on typing and crossmatching of, 403; response of dicumarol-induced hypoprothrombinemia to vitamin K, 412; rhesus factor (D) at Maternity Department of University of Louvain; results of prenatal investigation and technique of exchange transfusion treatment, 485; placental, plus alcohol introduced as transfusion therapy in Poland, 503; incompatible transfusions of, 504; technique and organization for conservation of, 504; role of anticoagulant therapy in surgery, 507; plasma expanders; collective review, 521; thrombin degradation test according to Lenggenhager; clinical and experimental studies, 598; experimental studies on animals regarding circulatory action of synthetic anticoagulant, thrombocid, 598; studies on vasculoactive component of thrombocid, 599

Blood pressure, Contribution to study of syndrome of portal hypertension, 40; urologic aspects of arterial hypertension, 67; in varices of lower extremities, 190; restoration of volume of, in seriously injured patients, 393; early recognition and management of shock, 395

Blood transfusion, Use of intrailiac, in cases of impassable veins, 89; fatal reactions from, due to massive bacterial contamination of blood, 89; experimental studies with intra-arterial transfusion, 296; placental blood plus alcohol introduced as therapy in Poland, 503; technique and organization for conservation of blood for, 504; reanimation with endocarotid transfusion in cranial direction, 590; intra-arterial infusion; simplified technique, 590

Blood vessels, Simultaneous bilateral radical neck dissection with recovery; report of 2 cases, 10; portacaval venous shunt, 40; venograms found in connection with hysterosalpingography, 45; vasa previa, 53; direct and retrograde aortography, 84; technique of translumbar arteriography, 86; sequelae of deep thrombosis in lower limbs, 87; vascular spasm, 88; attempts to treat cerebrovascular accidents and their paralytic sequelae, 123; graft of, in surgical treatment of congenital heart disease, 132; laceration of aorta, 134; experimental investigation of intrahepatic circulation after arteriovenous hepaticoportal anastomosis, 156; study of tumors of vascular sheaths, 187; results of preservation of grafts of, in antihistaminic solutions, 187; studies with arteriovenous fistulas; influence of posture upon volume flow, 190; cerebral revascularization; critical evaluation of 14 operated cases, 241; technique of endocardial anastomosis for circumventing pulmonic valve, 247; account of gastroduodenal anatomy of importance in palliative gastric resection, 254; use of temporary polythene shunts to permit occlusion, resection, and frozen homologous graft replacement of vital segments of, 292; treatment of disease of peripheral, 292; thrombosis, 297; surgical treatment (Trendelenburg operation) of massive pulmonary embolism; report of 22 cases, 298; intravascular agglutination and vascular stasis in peptic ulceration, 346; traumatic arteriovenous fistulas and aneurysms in war wounded, 388; preoperative phlebography of lower limb, 389; experimental study of restoration of continuity of large, by means of plastic tubes, 390; cardiovascular repercussions in exeresis of lung; clinical and experimental study, 402; angiopulmography, 410; experimental studies regarding ligature of hepatic artery and anastomosis between hepatic artery and portal vein, 467; intra-arterial priscoline therapy for peripheral disturbances of, 503; surgical considerations in intrathoracic aneurysms of aorta and great, 552; arterial, of human stomach, 555; nontraumatic arterial aneurysms of extremities, 588; deep venous thrombosis in leg following effort or strain, 589

Bone, Local stimulation of growth of long, 70; multiple cystic tuberculosis, 71; avascular necrosis of, 71; report of operative treatment of nonunion of long, 74; control of length of, 75; growth of; methods of assessing and clinical importance, 80; simple suture for repair of tendon to, 81; solitary plasmocytoma, 103; pathogenesis of osteochondritis dissecans, 180; osteochondritis dissecans with spontaneous healing, 180; spontaneous cure of osteochondrosis dissecans, 180; behavior of callus of, in animals subjected to repeated fractures, 185; variations in roentgen appearance of skeletal system in myeloma, 202; osteoid osteoma, 205; pathogenesis and classification of osteochondritis, 283;

unilateral limb lengthening associated with hematogenous osteitis in childhood, 286; tuberculosis of, and joints, 375; treatment of tuberculous disease of, by surgical drainage combined with streptomycin, 375; giant-cell tumor of, 377; intraosseous fibroma, 377; congenital osseous anomalies of carpus; synostosis congenita bilaterale of semilunar and pyramidal bones, 377; transplantation with bank, 383; aseptic necroses of, 384; osteogenetic potency and formation of new, by induction in transplants to anterior chamber of eye, 387; streptomycin in tuberculosis of, and joints, 496; streptomycin in treatment of tuberculosis of, and joints, 497; evaluation of streptomycin therapy in controlled series of 90 cases of skeletal tuberculosis, 497; resection of diaphysis of long tubular, in hematogenous acute suppurative osteomyelitis, 499; chemotherapy and surgical treatment of tuberculosis of, and joints, 499; combined surgery and chemotherapy of abscesses in tuberculosis of, and joints; early results, 500; radical treatment of tuberculosis of, and joints, 500; experiences with benign tumors of, in pediatric practice, 513; epicondylitis of humerus, 580; results of insertion of cancellous, in cases of pseudarthroses of carpal navicular, 581; homoplastic granulate of, as implantation material in orthopedic surgery, 587

Bone bank, Problems of, 74; transplantation with material from, 383

Brachial plexus, Scalenus syndrome, 125

Brain, Diagnosis of gliomas by combined electroencephalographic and angiographic studies, 11; intraventricular meningioma simulating pituitary tumor, 11; studies regarding determination of normal location of pineal gland on normal craniogram, 95; attempts to treat cerebrovascular accidents and their paralytic sequelae, 123; uptake of radioactive phosphorus in normal, and tumors of, 123; tumors of pituitary body and its environs, 124; evaluation of "seton" procedure in treatment of infantile communicating hydrocephalus, 241; cerebral revascularization; critical evaluation of 14 operated cases, 241; anterior cingulectomy in treatment of mental disease, 242; follow-up study of 238 leucotomized patients, 242; electroencephalographic observations in cases of aneurysm and arteriovenous fistula of head and neck, 293; use of serial angiography in diagnosis of space-occupying intracranial lesions, 329; anatomoclinical study of glioepitheliomas (ependymomas), 329; factors influencing filling of anterior cerebral artery in arteriography, 405; electroencephalographic changes in strabismus, 428; symptoms and treatment of pituitary tumors, 437; carotid-cavernous aneurysm, 547; expanding intracranial lesions in childhood, 548; tumors of, in children, 593; experimental cerebral radionecrosis produced by contact roentgen therapy, 593

Breast, Pain in, 13; carcinoma of, 13; pain in carcinoma of, 13; sex hormones in advanced cancer of, 13; bleeding from nipple, 126; ultropak and doubtful tumors of, 126; carcinoma of male, 126; results of treatment of cancer of, 244; results of surgical treatment of unilateral carcinoma of, in women, 244; rare benign tumors of, 440; osteogenic sarcoma of, 440; Krukenberg tumor with primary cancer in; study of ovarian metastases of mammary cancer; 476; tuberculous disease of, 549

Bronchiectasis, Developmental origin of, and of cystic and emphysematous changes in lungs; new concept, 16; results of surgery for, 17; primary pulmonary tuberculosis as cause of, in children, 245

Bronchus, Adenoma of, treated by local resection and reconstruction of left main, 128; minute carcinoma of major, 245; use of viable pedicled graft for repairing extensive defect of trachea and, 441; adenoma of, 449; coverage of stump of, with transplanted periosteal flap, 449; plastic reconstruction of trachea and, 549; open closure of, and resection of carina and of tracheal wall, 550

Burns, Hydrosulfosol as treatment of chemical, of eye, 4; treatment of, of esophagus, 136; fatality due to duodenal ulcer hemorrhage in case of, 254; treatment of, 298; treatment of chemical, of eye with corvasymton, 324; pathogenesis and treatment of severe, 397; mass treatment of, in atomic warfare, 397; study of several recent publications on severe, 398; rehabilitation of patients with deep, 403

CALCIFICATION, Symmetrical, in cerebellum, 406

Calcinosis, Observation of tumoral, which was greatly improved by thymoparathyroidectomy; study of calcium balance after minimal intake, 518

Calcium, Parathyroid glands; collective review, 417; observation of tumoral calcinosis which was greatly improved by thymoparathyroidectomy; study of balance of, after minimal intake, 518

Calculi, Frequency of recurrence of, in gallbladder after cholecystolithotomy, 42; choice of therapeutic measures in management of chronic relapsing pancreatitis and pancreatolithiasis, 160; surgical indications in "silent" and fulminant, 467; preservation of gallbladder in treatment of, 467; recurring biliary, following cholecystectomy, 467; possibilities and limitations of chemical and pharmacodynamic methods to relieve obstruction of main biliary tract, 468; aluminum gels with constant phosphorus intake for control of renal phosphatic, 491; role of protective urinary colloids in prevention of renal, 491; problem of nonopaque urinary-tract, 574

Calories, Parenteral nutrition with solution containing 1,000, per liter, 91

Canal of Wirsung, Injection into, in course of cholangiography, 158

Cancer, Surgery of pain in incurable, 11; of breast, 13; pain in, of breast, 13; sex hormones in advanced, of breast, 13; coexistent bronchogenic, and active pulmonary tuberculosis, 19; bronchial; 196 surgical cases, 19; of middle third of esophagus; esophagectomy with supraaortic esophagogastric anastomosis, 25; subtotal esophagectomy in high esophageal, 26; development of, in gastric ulcer and ulcer symptoms in gastric, 32; of stomach, 32; observations on treatment of, of rectum, 38; sexual life of patients with, of cervix cured by irradiation, 45; new viewpoints in treatment of recurrent, of female genitalia, 48; surgery of advanced pelvic, in women, 49; primitive hepatic, in pregnancy, 52; squamous cell, occurring in stump of chronically infected ureter many years after nephrectomy, 61; diagnosis of osseous metastases from, of prostate and Paget's disease, 64; further observations on diagnostic value of pulmonary angiography in bronchiogenic, 95; experiences in treatment of skin, with ultrasoft roentgen rays, 1933–1946, 98; results of treatment of skin, with ultrasoft roentgen rays given in single dose, 98; of male breast, 126; bronchogenic, 129; bronchogenic; its frequency, diagnosis, and early treatment, 129; surgical treatment of, of cervical and upper thoracic esophagus, 136; infrapapillary, of duodenum, 148; of right colon, 150; total extirpation in treatment of, of rectum and personal technique, 154; recurrent, of common bile duct and periampullary region, 159; therapy of, of uterus, 164; study of, of uterine corpus; value of suction biopsy in diagnosis; report of 33 cases,

164; treatment of, of vulva, 166; esophagus and mediastinal lymphadenopathy in bronchial, 199; ovarian, 202; limitations of histology in prognosis of radiation-treated, 204; action of some antineoplastic chemotherapeutic agents on cell division, 206; experimental study of potency of aromatic amines to produce, 206; chemotherapy of, 206; of gums, 238; squamous cell, of floor of mouth, 238; of tongue, 239; results of treatment of, of breast, 244; results of surgical treatment of unilateral, of breast in women, 244; clinical features of operable and inoperable bronchogenic, 245; minute, of major bronchi, 245; total gastrectomy for; technique and results, 254; anterior resection of, of rectum, 257; of pancreas, 262; actual concept of treatment of cervical, 266; can results of irradiation in, of uterine cervix be improved by prophylactic hysterectomy, 266; of cervical stump after subtotal hysterectomy, 267; prophylactic treatment of genital, 270; primary, of female urethra, 271; chemical nerve block for amelioration of pain in cases of inoperable genital, 271; neurosurgical pain amelioration in instances of incurable genital; experience with sacral resection of hypogastric and pelvic nerves according to Thiermann, 271; of adrenal cortex with endocrine manifestations, 279; proctologic manifestations of, of prostate, 280; recent clinical experience with grid in x-ray treatment of advanced, 308; of thyroid and nontoxic nodular goiter, 326; diverticula, pseudocancer, and, of colon; 5 observations, 349; arising in adenomas of colon and rectum, 349; 2 cases of, of pancreas simulating chronic pancreatitis and idiopathic sprue, 357; adrenocortical, in children, 367; primary, of ureter, 370; primary, of male urethra, 371; urologic complications of, of uterine cervix, 374; roentgenological findings accompanying, of pancreas, 407; hysterographically visualized radionecrosis following intrauterine radiation of, of corpus of uterus, 408; treatment of uterine, with radioactive cobalt (Co^{60}), 411; parathyroid glands; collective review, 417; indications for radical surgery in treatment of, of head and neck, 433; radioiodine in treatment of metastatic thyroid, 435; of intrathoracic trachea; excision and repair with tantalum gauze-fascia lata graft, 441; is it possible to determine operability of bronchogenic, by roentgenologic examination, 449; of esophagus, 455; of colon, 463; of rectosigmoid and upper part of rectum, 465; extirpation of rectum by sacroabdominal approach, 466; early diagnosis of cervical, and its treatment in noninvasive stage, 473; preinvasive, of cervix, 474; postoperative recognition and further management of unsuspected cervical, 474; results of treatment of cervical, in Heidelberg Clinic, 1936–1945, 474; results of treatment of, of uterine cervix, with reference to 1,374 cases at Anticancer Center, Lyons, France, 475; Krukenberg tumor with primary, in breast; study of ovarian metastases of mammary cancer, 476; discussion on treatment of, of bladder, 493; of prostate with reference to hormonal treatment, 494; treatment of, of skin, 514; management of head and neck, by general surgeon, 543; application of combined hemimandibulectomy and neck dissection to oral, 543; of hypopharynx and its surgical treatment, 545; combined operations in management of, of head and neck, 545; primary, of lung, 550; newer palliative measures in management of inoperable bronchogenic, 550; of esophagus, 554; of rectum, 562; causes of death in, of cervix influencing modern trends in treatment, 567; vaginal smear as screening test, 568; of prostate, 578

Capillaries, Evaluation of permeability of, in postoperative collapse and its treatment with saline infusions, studied by **hematocrit-protein diagram**, 395

Carbohydrates, Nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209

Cardia, Hiatal hernia, brachyesophagus and incompetence of, in children, 135

Cardiospasm, Dysphagia with special reference to, 248

Carina, Open closure of bronchus and resection of, and of tracheal wall, 550

Carotid artery, Accidental incision of aneurysm of left common, 87

Carotid body, Tumors of, 240; cervical neurofibroma in differential diagnosis of tumor of, 545

Carotid sinus, Syndrome of, 294; vasomotor reflexes of, in experimental traumatic shock, 309

Cartilage, Results of chondrectomy in chondromalacia of patella, 379; production of ectopic, 519

Casein digests, Plasma expanders; collective review, 521

Cataract, Extraction of, after glaucoma surgery, 4; intraocular acrylic lenses; recent development in surgery of, 235

Cecum, Volvulus of, 34; volvulus of, 152; volvulus of, 255; sclerohypertrophic typhlitis, 255; reticulosarcoma of, 463; nonspecific inflammatory tumors of ileum and, 566

Cells, Response of human tissues to radiation with special reference to differentiation, 99; action of some antineoplastic chemotherapeutic agents on division of, 206; limitations of cytologic diagnosis with employment of different methods of examination, 361; comparative cytohistologic study of malignant tumors, with consideration of phase-contrast picture, 414; cytological and cytochemical approach to understanding of radiation damage in dividing, 515

Cerebellum, Symmetrical calcification in, 406

Cervix, Sexual life of patients with carcinoma of, cured by irradiation, 45; involution of, 266; can results of irradiation in cancer of uterine, be improved by prophylactic hysterectomy, 266; urologic complications of cancer of uterine, 374; preinvasive carcinoma of, 474; postoperative recognition and further management of unsuspected carcinoma of, 474; results of treatment of carcinoma of, in Heidelberg Clinic, 1936–1945, 474; results of treatment of cancer of uterine, with reference to 1,374 cases at Anticancer Center, Lyons, France, 475; primary adenocarcinoma of, 567; causes of death in carcinoma of, influencing modern trends in treatment, 567

Cesarean section, Death during, 54; crisis in matter of indications for, 570

Chemotherapy, Action of some antineoplastic agents on cell division, 206; of cancer, 206; for nerve block for amelioration of pain in cases of inoperable genital carcinoma, 271; and antibiotics in surgical infections, 398; and surgical treatment in bone and joint tuberculosis, 499; combined surgical and, of abscesses in bone and joint tuberculosis; early results, 500

Children, Congenital atresia of small intestine in, 33; appendicitis in, 35; acute cholecystitis in, 42; transient synovitis of hip joint in, 73; obstructive lesions in gastrointestinal tract of infants and, 141; techniques in pediatric anesthesia; nonrebreathing method, 195; unilateral limb lengthening associated with hematogenous osteitis in, 286; mixed adrenal diseases of infancy, 367; adrenocortical carcinoma in, 367; coxa vara in; clinical appearance and etiological problems, 378; urologic problems in pediatric x-ray diagnosis, 408; acute appendicitis in, 462; appendicitis during first 2 years of life, 462; fracture of neck of femur in, 500; lesions of upper gastrointestinal tract in infants and, 512; experiences with benign bone tumors in

pediatric practice, 513; recurrent nodular goiter in, 545; expanding intracranial lesions in, 548; acute intestinal obstruction in, 559; brain tumors in, 593
Cholangiography, Injection into canal of Wirsung in course of, 158
Cholecystectomy, Discussion on origin of so-called "amputation neuromas" after, 158
Cholecystitis, Acute, in childhood, 42; acute, 156; pericholecystic lipoid granuloma as cause of certain cases of chronic, 157
Cholinesterase, Curves of concentration of proteins, red cells, and activity of, in serum after gynecologic interventions, 269
Chondrosarcoma, Intranasal, 544
Chorioepithelioma, Radiological management of; report of 2 cases (1 with pulmonary metastasis) with 10 year follow-up, 278
Chorion, Sarcomas of cytogenic; sarcomas of endometrium, 165
Choroid, Atypical coloboma of, with dysplasia of macula, 5; possible malignant melanoma of, 544
Chylothorax, Traumatic, 137
Circulation, Placental; maternal and fetal, 55; maintenance of life by homologous lungs and mechanical, 104; cardiac catheterization in congenital heart disease; 4 cases of pulmonary stenosis with increased pulmonary blood flow, 131; studies of, in mitral stenosis before and after commissurotomy, 133; collateral, following ligation of right subclavian artery, 187; clinical tests for evaluation of, in tubed pedicles and flaps, 197; diagnosis and therapy of congenital angiocardiopathies, 247; carotid sinus syndrome, 294; bloodless surgery by means of controlled, 300; factors of, affecting anesthesia in surgery for congenital heart disease, 301; shunting in human kidney, 309; effects upon lung of varying periods of temporary occlusion of pulmonary artery, 333; reviews and considerations of blood coagulation in portal hypertensives subjected to splenorenal anastomosis, 358; and respiratory effects of continuous versus phasic lung inflation in open-chest dogs, 442; kidneys in tourniquet shock, with particular reference to changes in; experimental study, 490; experimental ascites; its production and control, 599
Cirrhosis, Duodenitis and Mossé-Marchand-Mallory's, 34
Clubfoot, Development of, due to disturbance of epiphysial growth following radium treatment of hemangioma, 98
Coagulation, Mechanism of blood; historical review and outline of modern concepts; collective review, 105
Cobalt^{60} therapy, Physical characteristics of radiation in, 411; treatment of uterine cancer with radioactive, 411; clinical possibilities of, 515
Colitis, Results of surgical treatment of ulcerative, 37; benign ulcers of greater curvature associated with ulcerative, and cirrhosis of liver, 142; surgical treatment of chronic ulcerative, 560; chronic ulcerative, and pregnancy, 569
Collective review, Mechanism of blood coagulation; historical review and outline of modern concepts, 105; nutrition following total gastrectomy with particular reference to fat and protein assimilation, 209; cardiac resuscitation, 313; parathyroid glands, 417; plasma expanders, 521
Colon, Replacement of stomach with, 33; rectosigmoidectomy for Hirschsprung's disease, 37; double tumor of rectum and, 38; etiology and pathogenesis of diverticula of, 148; second roentgenologic report on diverticulosis of; differential diagnosis, 148; complications of diverticulitis of; their surgical treatment, 149; multiple polyposis; results of fulguration of polyps in distal portion of, after ileosigmoidostomy and colectomy, 149; carcinoma of right, 150; multiple primary malignant tumors involving, and rectum; report of 94 cases, 154; surgical treatment of diverticula of iliopelvic, 256; megacolon in adult, 257; diverticula, cancer, and pseudocancer of; 5 observations, 349; carcinoma arising in adenomas of, and rectum, 349; infarction of left, 463; carcinoma of, 463; physiological operation for idiopathic congenital megacolon; Hirschsprung's disease, 465; biochemical changes after anastomosis of ureter with, 494; adenomatous polyps of, and rectum, 561
Color, Binocular white from red and green, and three-component theory, 4
Conjunctivitis, Dacryocitogram as new method of morphologic investigation of, 324
Cornea, Treatment of conical, by grafting of, 4; plasma implantations in, 430
Cortisone, Therapy with, in Dupuytren's contracture, 288; combined effect of, and partial protein depletion on wound healing, 509; surgical use of ACTH and, 517
Coxa vara, Results of treatment of, of adolescence, 182; adolescent, 286; in infant; clinical appearance and etiological problems, 378
Cranium, Clues in intracranial abnormality, 405
Curare, Use of, locally in surgery and obstetrics, 400
Cystadenoma of pancreas, 43
Cysts, Of parathyroid, 9; anatomic study, classification, origin, and histogenesis of air, of lung, 15; developmental origin of, and bronchiectatic and emphysematous changes in lungs; new concept, 16; ruptured endometrial, as cause of acute abdominal symptoms; endometrial pelviperitonitis, 45; branchial, and fistulas; study of 75 cases relative to clinical aspects and treatment, 122; suppurating bronchiogenic, 138; formation of inclusion dermoid, following whole-thickness skin-graft repair of hernia, 140; angiomatous enterocyst of mesentery, 147; of spleen; report of case, 161; congenital dermoid, of nose, 237; intrathoracic (mediastinal), and their classification, 342; polycystic disease of liver; study of 24 cases, 350; parathyroid glands; collective review, 417; pulmonary sequestration with, and abnormal artery of aortic origin; 6 case reports, 442; paramediastinal, containing parotid enzymes; differential diagnosis of mediastinal, and their surgical therapy, 456; perinephric, 492
Cytology, Present status of exfoliative, in diagnosis of gastrointestinal malignancy, 560

DACRYOCITOGRAM as new method of morphologic investigation of conjunctivitis, 324
Deafness, Nuclear jaundice and, 7
Deaths, Frequency of maternal, 366
Deciduoma malignum, Anatomopathologic and clinical considerations with reference to, of uterus, 170
Deformities, Local stimulation of growth of long bones, 70; control of bone length, 75; torsion of leg causing unusual, 290; relationship between sacroiliac junction and spinal, 379; tibia vara due to osteochondrosis of tibia, 380; arthroplasty and arthrodesis in arthrosis of hip with, 382; do attempts at abortion lead to, 486
Dextran, Shock therapy with intraperitoneal infusion of blood volume replenishers; and PVP, 92; effect of, on blood typing and crossmatching, 403; plasma expanders; collective review, 521
Diagnosis, Consideration in differential, of hepatocellular and obstructive jaundice from surgical standpoint, 40; and management of ectopic pregnancy, 50; silicone-tube coagulation time as aid in, of phlebothrombosis, 87; new method of cytological, in diseases of stomach, 142; value of routine anosigmoidoscopy as procedure

for, in general practice, 154; use of sodium fluorescein and atabrine in, of tumors 205; vaginal cytology in, and therapy of hypophyso-ovarian dysfunction, 270; cardiac resuscitation; collective review, 313; limitations of cytologic, with employment of different methods of examination, 361; fetal electrocardiography, 363; differential, of dystrophic states and cervical epitheliomas; study of glycogen; uncertainty of smears, 472; early, of cervical cancer and its treatment in noninvasive stage, 473

Diaphragm, Esophageal hiatus hernia of, 23; hernia of, 27; hernia of fissure of Larrey in, 28; hernia of, (pericardial), 137; discussion on hiatus hernia, 565

Diastase, Pancreatitis; current concepts, 355

Diet, Is it necessary to continue treatment by, after gastric resection for ulcer of stomach and duodenum, 32; nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209; new regimen in feeding critically ill, 393

Digestion, Two contributions on injuries of pancreas, with suggestion of, of food by duodenal juice of relatives in absence of ferments of stomach, liver, and pancreas, 469

Digestive tract, Esophagogastrostomy for cicatricial stenosis of esophagus, 341

Dihydrone pectinate, Pharmacologic study of new analgesic in human and veterinary medicine, 401

Dislocations, Our method for operative treatment of recurrent, of shoulder, 78; surgical treatment of habitual, of patella, 80; congenital, of hip, 385; traumatic, of hip, 385; reposition with arthroplasty for congenital, of hip in adults, 582; carpometacarpal; total, 583

Diverticula, Complications of gastrointestinal, demonstrated by x-rays, 29; clinical and histopathological contribution on duodenal, treated surgically, 33; etiology and pathogenesis of, of colon, 148; second roentgenologic report on, of colon; differential diagnosis, 148; surgical significance of duodenal, 148; of gastrointestinal tract, 252; surgical treatment of, of iliopelvic colon, 256; surgery of, of urinary bladder, 280; cancer, pseudocancer, and, of colon; 5 observations, 349; of ureter; report of another authentic case, 370; surgical treatment of epiphrenic, of esophagus, 454; of small intestine, 461; ureteric compression by traction, of duodenum, 492

Diverticulitis, Complications of, of colon; their surgical treatment, 149

Ductus arteriosus, Artificial, in dog with secondary hypertension in pulmonary artery, 87; thoracic aortography with reference to its value in patent, and coarctation of aorta, 303

Duodenitis and Mossé-Marchand-Mallory's cirrhosis, 34

Duodenum, Is it necessary to continue dietary treatment after gastric resection for ulcer of stomach and, 32; clinical and histopathological contribution on diverticulum of, treated surgically, 33; surgical significance of diverticula of, 148; infrapapillary carcinoma of, 148; surgical intervention in massive gastroduodenal bleeding, 253; remote results in resections for gastroduodenal ulcers, 254; nonpenetrating abdominal trauma, with reference to lesions of, and pancreas, 264; aberrant pancreas as cause of syndrome of, 354; prolapse of gastric mucosa into, 406; so-called arteriomesenteric obstruction of, 461; basic principles in surgical treatment of ulcers of, 462; ureteric compression by traction diverticulum of, 492; indications for surgical treatment of gastric and duodenal ulcers and their complications, 556; selection of patients with ulcer of, for vagotomy, 557; results of vagotomy during 7 years, 558

Dupuytren's contracture, Cortisone therapy in, 288, 498

Dysgerminoma of ovary, 476

Dystocia, Discussion of further 90 cases of, treated by method of Willet-Gauss, 273

EAR, Symposium on audiology, 6; genesis of otosclerosis, 7; otosclerosis; closed method of fenestration, 7; nuclear jaundice and deafness, 7; painful nodule of, 118; long-term results of fenestration surgery, 118; congenital atresia of auditory canal; two-stage operation with fenestration, 235; suppurative labyrinthitis, 236; observations on eustachian tube, 325; aural manifestations of allergy, 325; viewpoints on operative treatment in Ménière's disease, 432

Echinococcus, Results in 61 cases of, cysts of lungs treated surgically, 447

Eclampsia, Hydration treatment of, 273; etiology of preeclampsia, 481

Edema, Chronic, of lower limbs, 190

Elbow, Familial dysgenesis of both; previously unreported congenital disease of extremities, 285; surgical pseudarthrosis of, for impaired pronation and supination, 581

Elderly patients, Surgery in, 309; major surgery in, 505

Electrocardiography, Fetal, 363; prevention and treatment of disturbances of cardiac rhythm registered by, during surgery of heart 402

Electrolytes, Preoperative and postoperative parenteral maintenance of balance of with salt mixture containing sodium, potassium, chloride, and phosphate, 192; in surgery, 207; abnormalities of, in pyloric obstruction resulting from peptic ulcer or gastric carcinoma, 345; balance of water and, in surgery, 505

Elephantiasis of lower limbs, 102

Embolism, Fatal pulmonary; study of 130 cases of autopsy-proved fatal, 192; surgical treatment (Trendelenburg) of massive pulmonary; report of 22 cases, 298; increase of postoperative thrombosis and, and their management with anticoagulants, 362; nonfatal case of amniotic fluid, 365; treatment and prophylaxis of thrombosis and, with dicumacyl; problems and results, 396; results in systematic prevention and treatment of thrombosis and, with anticoagulants, 479; fatal pulmonary, in Heidelberg Clinics; study of 377 cases over 20-year period, 590

Embryo, Radiation hazards to, and fetus; experiments with mice, 305

Encephaloceles, Intranasal, 237

Endocrine therapy in treatment of functional amenorrhea and functional oligohypomenorrhea, 270

Endometriosis, Urologic aspects of; renal, ureteral, and vesical forms, 48; inguinal, diagnosed preoperatively as irreducible inguinal hernia, 48; in pregnancy; clinical observations, 364

Endometrium, Cytodynamic properties of human, 163; sarcomas of cytogenic chorion; sarcomas of, 165; adenocarcinoma of; clinicopathologic study, 475

Enteritis necroticans, 559

Enzymes, Systemic changes in, induced by radiation therapy of malignant tumors, 101; mechanism of blood coagulation; historial review and outline of modern concepts; collective review, 105; nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209

Eosinophils, Fluctuations in number of, in blood during postoperative period, 192; response of, in newborn and pregnancy at term, 312

Ependymoma, Anatomoclinical study of glioepitheliomas. 329

Epididymis, Primary malignant neoplasms of spermatic cord and; 2 case reports, 66

Epiphyses, Multiple hereditary disturbances of, and osteochondrosis dissecans, 305
Epistomas, Nosology of bronchial (epitheliomas with transformed stroma), 448
Epithelioma, Differential diagnosis of dystrophic states and cervical; study of glycogen; uncertainty of smears, 472
Epithelium, Transplantation studies on sheets of pure epidermal, and on epidermal cell suspensions, 520; physiology of transitional, of urinary tract; vesical secretion in dog, 574
Erythroblastosis, Practical experiences with interruption of pregnancy and sterilization in familial, 273
Esophagitis, 454; nonpeptic, probably infectious, origin of certain types of, 25
Esophagus, Hiatus hernia of diaphragm, 23; cancer of middle third of; esophagectomy with supra-aortic esophagogastric anatomosis, 25; subtotal esophagectomy in high carcinoma of, 26; hiatal hernia; brachyesophagus and incompetence of cardia in children, 135; treatment of congenital atresia of, 135; treatment of burns of, 136; surgical treatment of carcinoma of cervical and upper thoracic, 136; and mediastinal lymphadenopathy in bronchial carcinoma, 199; atresia of, accompanied by remarkable vessel anomaly, 248; dysphagia with special reference to cardiospasm, 248; gastroesophageal reflux, 253; fish bones in, 341; esophagogastrostomy for cicatricial stenosis of, 341; treatment of megaesophagus, 342; congenital varicosities of, 453; pathologic changes in megaesophagus; dystonia of, 454; surgical treatment of epiphrenic diverticulum of, 454; surgical therapy of cicatricial stenosis of, 454; benign tumors of thoracic portion of, 455; carcinoma of, 455; spontaneous laceration of, 553; carcinoma of, 554
Ethiomine, Experimental production of pancreatitis with, 469
Eustachian tube, Observations on, 325
Exophthalmos, Pituitary; assessment of methods of treatment, 1; auscultation of orbit as diagnostic method in unilateral, 323
Explosions, Survey of fires and, in hospitals of United States, 401
Eye, Retracted socket of, 1; pituitary exophthalmos; assessment of methods of treatment, 1; influence of terramycin on course of experimental tuberculosis of, 2; phasic variations in tension of, in primary glaucoma, 2; transient monocular blindness associated with hemiplegia, 2; role of heredity in etiology and treatment of strabismus, 3; surgical treatment of esotropia with bilateral evaluation in adduction, 3; binocular white from red and green, and three-component theory, 4; hydrosulfosol as treatment of chemical burns of, 4; treatment of conical cornea by corneal grafting, 4; cataract extraction after glaucoma surgery, 4; atypical coloboma of choroid with dysplasia of macula, 5; retroplacement of inferior oblique at its scleral insertion, 5; effects of ultrasonic waves on refractive media of, 5; preliminary report on use of methonium compounds and general anesthesia in surgery of, 5; effect of sutures and of thrombin upon healing of ocular wounds, 6; proptosis caused by lipoidosis, 115; orbital implants; review of results obtained at Moorfields branch of Moorfields, Westminster, and Central Eye Hospital, London, 115; retrolental fibroplasia, 116; pseudoglioma, 117; detection of intraocular tumors with radioactive phosphorus, 117; stratigraphic study of optic canal, 198; phase contrast microscopy of animal vitreous body, 232; congenital malformations of, induced in mice by maternal anoxia, 232; changes in, following exposure to metallic mercury, 233; neurovascular mechanism and control of intraocular pressure, 233; experimental pupil-block glaucoma, 233; surgical treatment of congenital glaucoma, 234; retrolental fibroplasia, 234; intraocular acrylic lenses; recent development in surgery of cataract, 235; anesthesia for long or technically difficult surgical procedures on, and larynx, 301; value of orthoptics in treatment of squint, 324; dacryocitogram as new method of morphologic investigation of conjunctivitis, 324; treatment of chemical burns of, with corvasymton, 324; ocular sarcoidosis; report of 3 cases, 324; osteogenetic potency and new bone formation by induction in transplants to anterior chamber of, 387; nutritional amblyopia, 428; electroencephalographic changes in strabismus, 428; dacryocystorhinostomy by intubation, 428; sympathetic ophthalmia, 429; sulfonamides and antibiotics in trachoma, 429; antibiotic-producing bacteria of ocular flora, 429; surgical construction of conjunctival culde-sac and preferred methods for partial or total socket restoration, 430; plasma implantations in cornea, 430; studies on pathogenesis of retrolental fibroplasia, 430; subclinical retinal detachments, 431; experiences with tumors of retina, 431; intraocular rubber foreign bodies after surgery, 432; physiopathology and technique of iridencleisis, 544; possible malignant melanoma of choroid, 544

FACIAL nerve, Extratemporal repair of; case reports, 124; management of traumatic lesions of, 437
Fasciodesis, Milch, for reconstruction of tibial collateral ligament, 77
Fat, Experimental evaluation of effectiveness of pancreatin in reducing loss of fecal nitrogen and, following total gastrectomy, 159; nutrition following total gastrectomy with particular reference to assimilation of, and protein; collective review, 209; experimental study of assimilation of protein and, after total gastrectomy, 347
Feeding, New regimen in, of critically ill, 393
Feet, Symmetrical synostoses of hands and, 289
Femur, Fractures involving distal epiphyseal cartiage of, 78; fractures of shaft of, treated by medullary nailing, 80; fractures of neck of, following irradiation of pelvis, 286; supracondylar fractures of, 287; treatment of recent transcervical fractures of, 287; intramedullary nailing in pathologic fracture, 383; survey of late results in treatment of fracture of, according to A. M. Whitman-Löfberg, 386; treatment of nonunited fractures of shaft of, 386; fracture of neck of, in children, 500; impacted fractures of neck of, 501; immediate osteotomy for vertical fractures of neck of, 501; roentgenologic considerations in fractures of neck of, 514; conservative treatment of trochanteric fractures of, 584; prefractural status of neck of, 585; remarks with reference to mechanics and technique of nailing of fracture of neck of, 585
Fenestration, Otosclerosis; closed method of, 7; long-term results of, 118; congenital atresia of auditory canal; two-stage operation with, 235
Fertility, Male, 68
Fetus, Regulatory and adaptative factors in intrauterine development of, 173; duration of pregnancy and postmaturity, 277; radiation hazards to embryo and, 305; electrocardiography of, 363; diffuse reticulohemangioendothelioma of placenta with polyhydramnios and celomic monster exhibiting multiple malformations, 482; infections of, 485
Fibrin, Mechanism of blood coagulation; historical review and outline of modern concepts; collective review, 105
Fibrinogen, Mechanism of blood coagulation; historical review and outline of modern concepts; collective review, 105

Fibroma, Intraosseous, 377
Fibromyoma, Uterine, in adolescents, 266
Fibroplasia, Studies on pathogenesis of retrolental, 430
Fibrosis, Roentgenological picture in chronic nonspecific, of middle lobe; value of planigraphy, 410
Fibula, Fractures of shaft of tibia and, 586
Fingers, Cross-finger flaps in treatment of injuries to tip of, 302; pathology of interdigital pilonidal sinus, 412; stenosing tenovaginitis at wrist and, 498; Dupuytren's contracture, 498; elementary technique of repair of cutaneous losses of, 509
Fires, Survey of, and explosions in hospitals of United States, 401
Fistula-in-ano, Primary skin graft following excision of, 155
Fistulas, Branchial cysts and; study of 75 cases relative to clinical aspects and treatment, 122; congenital enteroumbilical, due to patent vitelline duct, 140; spontaneous internal biliobiliary, 158; studies with arteriovenous; influence of posture upon volume flow, 190; spontaneous internal biliary, of ulcerous origin, 260; electroencephalographic observations in cases of aneurysm and arteriovenous, of head and neck, 293; treatment of choledochoduodenal, due to ulcer, 353; vesicovaginal, 360; traumatic arteriovenous, and aneurysms in war wounded, 388; treatment of antro-oral, with reference to use of streptokinase and streptodornase, 432; treatment of oroantral, 545
Fluid, Limitations and dangers of replacement therapy with, 396; replacement of gastric and intestinal losses of, in surgery, 508
Foot, Development of clubfoot due to disturbance of epiphyseal growth following radium treatment of hemangioma, 98
Forceps, Present status of midforceps operation, 54; limitation of indications for use of, at superior strait, 274; Kielland, in transverse arrest, 483
Foreign bodies, Perforations of gastrointestinal tract due to, 29; in heart, 130; fish bones in esophagus, 341; intraocular rubber, after surgery, 432
Fractures, Result of excision of patella with, 75; indications of osteotaxis following technique of R. Hoffmann, 78; involving distal femoral epiphyseal cartilage, 78; femoral-shaft, treated by medullary nailing, 80; vertebral, with exposed spinal cord, 124; operative treatment of T and Y, of lower end of humerus, 185; behavior of bone callus in animals subjected to repeated, 185; management of recent nasal, 236; of neck of femur following irradiation of pelvis, 286; supracondylar, of femur, 287; treatment of recent transcervical, of femur, 287; Kuentscher's intramedullary pin, with reference to 541 cases of, 287; effect of thyroxin on experimental, in dogs, 311; of mandible; their orthodontic treatment, 322; intramedullary nailing in pathologic, 383; aseptic osseous, 384; recent and old, of eminentia capitata of humerus, 384; survey of late results in treatment of, of femur according to A.M. Whitman-Löfberg, 386; treatment of nonunited, of femoral shaft, 386; early mobilization in treatment of, of os calcis, 387; of neck of femur in children, 500; impacted, of neck of femur, 501; immediate osteotomy for vertical, of femoral neck, 501; of ankle, 501; roentgenologic considerations in, of neck of femur, 514; spontaneous, of both first ribs, 549; pertrochanteric and subtrochanteric, 584; internal fixation for intertrochanteric, 584; conservative treatment of trochanteric, of femur, 584; prefractural status of femoral neck, 585; remarks with reference to mechanics and technique of nailing of, of femoral neck, 585; of shaft of tibia and fibula, 586; conservative treatment of, of tibial plateau, 586; treatment of, of external tibial condyle, 587
Freezing, Preservation of arterial grafts by, 392; experimental study of effects of; partial dehydration and ultrarapid cooling on survival of dog skin grafts, 520
Frontal bone, Hemangiomas of, 322
Frostbite, Present status of treatment of, 193

GALLBLADDER, Angulations of, 41; acute cholecystitis in childhood, 42; frequency of recurrence of calculi in, after cholecystolithotomy, 42; indications and newer technique in primary surgery of biliary tract (excepting tumors), 155; acute cholecystitis, 156; pericholecystic lipoid granuloma as cause of certain cases ofchronic cholecystitis, 157; clinical findings in cases of benign tumors of fundus of, 158; nonsurgical diagnosis of postcholecystectomy syndromes, 352; surgical indications in "silent" and fulminant cholecystolithiasis, 467; preservation of, in treatment of cholelithiasis, 467
Gallstone obstruction of intestine, 352
Ganglia, Certain considerations of controlled hypotension in course of anesthesia, 300
Gastrectomy, Nutrition following total, with reference to fat and protein assimilation; collective review, 209; experimental study of protein and fat assimilation after total, 347
Gastritis, Giant hypertrophic, 253; massive hypertrophic, 555
Gastrointestinal tract, Foreign-body perforations of, 29; effect of Exalto-Mann-Williamson procedure on gastric secretion, 29; complications of diverticula of, demonstrated by x-rays, 29; surgical treatment of peptic ulcer, 30; role of ammonia reabsorption in acid-base imbalance following ureterosigmoidostomy, 62; obstructive lesions in, of infants and children, 141; leiomyosarcoma of, 141; multiple location in, of Kundrat's type of lymphosarcomatosis, 141; hemorrhage from peptic ulcer; analysis of 223 cases, 142; 10 years' experience with bleeding peptic ulcer, with emphasis on 45 fatal cases, 143; nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209; diverticula of, 252; acute severe hemorrhage of upper; review of 195 cases, 252; incidence and mechanism of early dumping syndrome after gastrectomy, 255; volvulus of cecum, 255; technique in surgery of, 258; topographic and morphologic modifications of, produced by extrinsic tumors, 304; volvulus of stomach, 344; importance of duodenopancreaticobiliary secretions in pathogenesis of gastroduodenal ulcers; therapeutic conclusions, 345; acute ulcers and hemorrhages of, 346; surgical treatment of peptic ulcer, 346; gastroenterostomy in surgical treatment of gastroduodenal ulcer, 457; basic principles in surgical treatment of duodenal ulcers, 462; replacement of gastric and intestinal fluid losses in surgery, 508; lesions of upper, in infants and children, 512; emergency diagnosis of bleeding of upper, by roentgen examination without palpation; Hampton technique, 513; present status of exfoliative cytology in diagnosis of malignancy of, 560; roentgen findings in instances of "digestive megasplanchnia," 594; emergency roentgenologic examinations in severe hemorrhages of gastroduodenal origin, 595
Gelatin, Plasma expanders; collective review, 521
Genital organs (female), Bacteroides infections of, 47; new viewpoints in treatment of recurrent carcinoma of female genitalia, 48; problems of conjugal sterility 167; prophylactic treatment of genital carcinoma, 270; chemical nerve block for amelioration of pain in cases of inoperable genital carcinoma, 271; neurosurgical pain amelioration in instances of incurable genital carcinoma; experience with sacral resection of hypogas-

tric and pelvic nerves according to Thiermann, 271; myomectomy; surgical technique and results in series of 1,150 cases, 359; condition of internal genitalia in cases of vaginal aplasia; hormone-induced morbid picture, 477; nonblastomatous postmenopausal metrorrhagia; clinical considerations, 478; alterations in clinical course of diffuse peritonitis of genital origin, 478; pregnancy associated with congenital abnormalities of female, 481
Genital organs (male), Male fertility, 68; problems of conjugal sterility, 167; retropubic surgery in benign prostatic lesions, 281; late results of perurethral prostatic resection, 281; anastomosis operations on vas deferens, 281; treatment of tuberculosis of; considerations arising from study of 1,650 cases in 25 years of practice, 282; ureteral injury by transurethral electroresection and coagulation, 372; testicular luxations, 372; results of medical and medicosurgical therapy in urogenital tuberculosis, 373; treatment of ectopia of testicle; results observed in 132 patients, 578
Girls, Typical knee pain in, 73
Glaucoma, Phasic variations in ocular tension in primary, 2; cataract extraction after surgery for, 4; experimental pupil-block, 233; treatment of congenital, 234
Glioma, Diagnosis of, by combined electroencephalographic and angiographic studies, 11
Globin, Plasma expanders; collective review, 521
Glomerular tuft, Structure of, 368
Goiter, Recurrent nodular, in children, 545
Grafts, Experimental use of free arterial and split-thickness skin grafts for bridging defects in common bile duct of dog, 42; report of operative treatment of nonunion of long bones, 74; vein inlay, in treatment of aneurysms and thrombosis of abdominal aorta, 85; immunological aspects of autografts and homografts in rabbits tested by in vivo and in vitro techniques, 93; effect of donor skin desensitization and ACTH on survival of skin homografts in rabbits, 94; blood vessel, in surgical treatment of congenital heart diseases, 132; primary skin, following excision of fistula-in-ano, 155; results of preservation of blood vessel, in antihistaminic solutions, 187; clinical tests for evaluation of circulation in tubed pedicles and flaps, 197; effect of ACTH on autogenous and homologous skin, in rabbits, 208; recovery of nervous functions in skin transplants, with reference to sympathetic functions, 310; further observations on use of temporary polythene shunts and frozen homologous replacement by, of major arterial segments in traumatic and malignancy surgery, 391; preservation of arterial, by freezing, 392; cross-leg flap procedure, 404; effect of adrenocorticotropic hormone on survival of homografts, 404; carcinoma of intrathoracic trachea; excision and repair with tantalum gauze-fascia lata, 441; transplantation studies on sheets of pure epidermal epithelium and on epidermal cell suspensions, 520; secondary contracting tendency of free skin, 520; experimental study of effects of freezing; partial dehydration and ultrarapid cooling on survival of dog skin, 520; heterogeneous arterial, 588
Granuloma, Of ureter, 60; pericholecystic lipoid; cause of certain cases of chronic cholecystitis, 157; oil, of peritoneum, 251
Graves' disease, Great practical value of auscultation of thyroid gland for diagnosis of, 434
Gums, Cancer of, 238
Gynecology, Venous thrombosis in obstetrics and, 46; clinical reports of Rotunda Hospital, Coombe Lying-In Hospital, and National Maternity Hospital, 56; clinical review of thrombocid, synthetic heparin, in obstetrics and, 366
HAND, Cortisone therapy in Dupuytren's contracture, 288; symmetrical synostoses of, and feet, 289; certain procedures for surgical rehabilitation of, in poliomyelitis, 381; compound wounds of, 508; rehabilitation of function of, in rheumatoid arthritis, 510
Harelip, Corrective procedures after operations for, or cleft jaw and palate, 326
Head, Maxillofacial injuries, 1; retracted eye socket, 1; hemangiomas of frontal bone, 322; management of cancer of, and neck by general surgeon, 543; combined operations in management of cancer of, and neck, 545; extradural hemorrhage, 547; delayed onset of symptoms due to extradural hematomas, 547
Headache, Prevention of, following spinal anesthesia; use of epidural saline; preliminary report, 196
Heart, Surgery in acquired disease of; surgical therapy of mitral stenosis, 20; operative treatment of mitral stenosis and its indications, 21; surgical treatment of mitral stenosis, 21; ballistocardiogram in constrictive pericarditis before and after pericardiectomy, 23; foreign bodies in, 130; with single ventricular chamber, 130; cardiac catheterization in congenital disease of; 4 cases of pulmonary stenosis with increased pulmonary blood flow, 131; cardiac catheterization in congenital disease of; direct demonstration of single ventricle, 131; observations on surgical treatment of congenital disease of, 131; blood vessel graft in surgical treatment of congenital diseases of, 132; cardiostathorrhaphy; splinting flaccid myocardium of coronary occlusion by surgical procedures, 132; responsibility of physician in selection of patients with mitral stenosis for surgical treatment, 132; circulatory studies in mitral stenosis before and after commissurotomy, 133; surgical relief of mitral stenosis; preliminary report, 246; technique of endocardial anastomosis for circumventing pulmonic valve, 247; cardiac catheterization and other physiological studies in 50 cases of congenital disease of, 247; diagnosis and therapy of congenital angiocardiopathies, 247; ligation of inferior vena cava in insufficiency of, 295; arrest of, 297; circulatory factors affecting anesthesia in surgery for congenital disease of, 301; resuscitation of; collective review, 313; arrest of, 337; hematological changes in patients with congenital cyanotic disease of, who have been subjected to operations designed to improve circulation to lungs, 337; surgical implications suggested by study of 54 anatomical specimens of tetralogy of Fallot, 338; surgical treatment of aortic stenosis, 340; anesthesia for surgical correction of cardiorespiratory anomalies, 402; cardiovascular repercussions in exeresis of lung; clinical and experimental study, 402; prevention and treatment of disturbances of cardiac rhythm registered by electrocardiography during surgery of, 402; surgical treatment of congenital and acquired valvular stenoses, 451; mitral valve disease in light of surgical treatment, 452; surgical and cardiological problem in operative treatment of mitral stenosis, 452; surgical treatment of mitral stenosis, 452; surgery of, 452; angiocardiography in congenital disease of, of cyanotic type, 511; functional problems in cardiac and pulmonary diseases and remarks on surgical intervention, 551; successful removal of tumor of, 552
Hemangiomas of frontal bone, 322
Hematomas, Delayed onset of symptoms due to extradural, 547; encysted pleuropulmonary, 550
Hemoglobin, Plasma expanders; collective review, 521
Hemophilia, Mechanism of blood coagulation; historical review and outline of modern concepts; collective review, 105
Hemoptysis, Clinical significance of, 334

Hemorrhage, Severe nosebleed and its treatment, 8; from nipple, 126; from peptic ulcer; analysis of 223 cases, 142; 10 years' experience with bleeding peptic ulcer, with emphasis on 45 fatal cases, 143; preliminary report on controlled hypotension, 195; acute severe upper gastrointestinal; review of 195 cases, 252; surgical intervention in massive gastroduodenal, 253; fatality due to duodenal ulcer, in burn case, 254; acute ulcers and, of gastrointestinal tract, 346; further studies on nature of, in radiation injury, 410; toxemic accidental, 480; emergency diagnosis of upper digestive tract, by roentgen examination without palpation; Hampton technique, 513; extradural, 547; emergency roentgenologic examinations in severe, of gastrointestinal origin, 595; acute radiation syndrome due to exposure of whole body to penetrating ionizing radiation, 596
Hemostasis, Bloodless surgery by means of controlled circulation, 300
Heparinization, Regional, after thromboendarteriectomy in treatment of obliterative arterial disease, 188
Hernia, Esophageal hiatus, of diaphragm, 23; diaphragmatic, 27; diaphragmatic, of fissure of Larrey, 28; inguinal endometriosis diagnosed preoperatively as irreducible inguinal, 48; hiatal, brachyesophagus, and incompetence of cardia in children, 135; diaphragmatica pericardialis, 137; recent advances in surgery of inguinal, 139; formation of inclusion dermoid cysts following whole-thickness skin graft repair of, 140; trauma; factor in inguinal, 251; femoral, 251; etiopathogenesis of anemia in diaphragmatic, of stomach, 252; discussion on hiatus, 565
Hernioplasty, Results of primary inguinal, 140
Hibernation, Artificial, 194; artificial; new practical details and latest results, 194
Hip, Legg-Perthes disease, 71; intrapelvic prominences of floor of socket of, in adults, with special discussion of protrusio acetabuli, 73; transient synovitis of, in children, 73; operative treatment of Perthes disease by means of boring and pegging, 75; results of treatment of coxa vara of adolescence, 182; pathogenesis and classification of osteochondritis, 283; adolescent coxa vara, 286; coxa vara infantum; clinical appearance and etiological problems, 378; indications and results of arthroplastic prostheses in malum coxae, 381; arthroplasty and arthrodesis in arthrosis deformans coxae, 382; congenital dislocation of, 385; traumatic dislocations of, 385; reposition with arthroplasty for congenital dislocation of, in adults, 582; pertrochanteric and subtrochanteric fractures, 584; internal fixation for intertrochanteric fractures, 584
Hirschsprung's disease, Physiological operation for idiopathic congenital megacolon, 465
Hodgkin's disease, Nitrogen mustard therapy in lymphoreticulosarcomatosis, lymphatic leucemia, and, 413; triethylene melamine therapy in, and other malignant diseases, 413; in pregnancy; report of 12 cases, 570
Hormones, Sex, in advanced breast cancer, 13; vaginal cytology in diagnosis and therapy in hypophysoovarian dysfunction, 270; effect of adrenocorticotropic, on survival of homografts, 404; parathyroid glands; collective review, 417; condition of internal genitalia in cases of vaginal aplasia; morbid picture induced by, 477; use of posterior pituitary extracts by slow continuous perfusion in treatment of functional dystocias during labor, 482; carcinoma of prostate with reference to treatment with, 494; primary hyperparathyroidism, 519
Hospitals, Survey of fires and explosions in, of United States, 401
Humerus, Operative treatment of T and Y fractures of lower end of, 185; recent and old fractures of eminentia capitata of, 384; epicondylitis of, 580
Hydrocephalus, 172; evaluation of "seton" procedure in treatment of infantile communicating, 241
Hypertension, Urologic aspects of arterial, 67; artificial ductus arteriosus in dog with secondary, in pulmonary artery, 87; kidney and, 175; malignant, with unilateral renal-artery occlusion, 175; unilateral pyelonephritis accompanied by; relieved by nephrectomy, 279; pathology and treatment of portal, 350; reviews and considerations of blood coagulation in patients with portal, subjected to splenorenal anastomosis, 358; medical and surgical treatment of permanent arterial, 439; study of bilateral total adrenalectomy in malignant, and chronic nephritis; preliminary report, 488; acute pancreatitis; significance of associated, 563
Hyperthyroidism, Use of antithyroid drugs in, 433; results in treatment of, with radioiodine (I^{131}), 433
Hypotension, Preliminary report on controlled, 195; certain considerations of controlled, in course of anesthesia, 300
Hypothyroidism, Peripheral nerve regeneration in experimental, 242
Hysterectomy, Morbidity studies in 1,000 consecutive cases of, 45

ICE, Pathogenesis of experimental shock due to, (cold), 412
Icterus, Postoperative, following gastric resection for duodenal ulcer, 143
Ileitis, Persistent or recurrent proximal, following surgery, 34
Ileum, Nonspecific inflammatory ileocecal tumors of, and cecum, 566
Ileus Paralytic, 147
Ilium, Relationship between sacroiliac junction and spinal deformities, 379
Immunity, Immunological aspects of, in autografts and homografts in rabbits tested by in vivo and in vitro techniques, 93
Infarction of left colon, 463
Infections, Nonpeptic, as probable origin of certain types of esophagitis, 25; bacteroides, of female genital tract, 47; antibacterial management of urinary tract, 67; prevention of, of thoracic surgical wounds by staphylococci from patient's skin, 137; experimental studies on hepatic flora in man, 258; chemotherapy and antibiotics in surgical, 398; fetal, 485; method for determination of antibacterial potency of serum during therapy of acute, 509; terramycin and aureomycin in surgical; report of 200 cases, 509; local use of streptokinase-streptodornase in chronic refractory areas of suppuration with draining sinuses, 510; treatment of postirradiation with antibiotics; experimental study on mice, 516; why are antibiotics ineffective against viral, 597
Intervertebral disc, Experimental investigations into physical properties of, 82; clinical observations and results of 1,000 operations for lumbosciatalgia resulting from hernia of, 183; non-neurological lesions simulating protruded, 289; x-ray visualization of, 305; study of late results from operations on, 330
Intestines, Congenital atresia of small, in children, 33; spontaneous elimination of invaginated loop of bowel with recovery, 33; persistent or recurrent proximal ileitis following surgery, 34; volvulus of cecum, 34; spontaneous perforation of large bowel, 36; tryptic activity and presence of cornified squamae in mecon-

ium as diagnostic aid in congenital obstruction of, 145; treatment of acute congenital occlusions of, 145; disappearance of tetany and anemia after resection of blind loop of, 146; obstruction of, 147; paralytic ileus, 147; retrograde intussusception of efferent loop after subtotal gastrectomy, 147; volvulus of cecum, 152; anastomosis of ureter with, 176; nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209; obstruction of; physiopathology, diagnosis, and treatment, 347; gallstone obstruction of, 352; neurofibromatosis of Recklinghausen in, 414; radiation injury to small, 461; diverticulosis of small, 461; acute obstruction of, in infancy, 559; acute perforation in regional enteritis, 559; enteritis necroticans, 559

Intoxication, Observations on water, in surgical patients, 506

Intussusception, Retrograde, of efferent loop after subtotal gastrectomy, 147; of ureter associated with benign polyp, 370

Iodine, Results in treatment of hyperthyroidism with radioiodine (I^{131}) 433; radioiodine in treatment of metastatic thyroid carcinoma, 435

Iridencleisis, Physiopathology and technique of, 544

Ischemia, Problems of, of lower extremity, 187

Isinglass, Plasma expanders; collective review, 521

JAUNDICE, Nuclear, and deafness, 7; differential diagnosis of, by means of liver function tests, 39; considerations in differential diagnosis of hepatocellular and obstructive, from surgical standpoint, 40

Jaw, Adamantinoma, 231; origin and treatment of malignant disease of upper, and nasal sinuses, 325; corrective procedures after operations for harelip or cleft palate and, 326

Jejunum, Spontaneous elimination of invaginated loop of bowel with recovery, 33

Joints, Multiple congenital articular rigidities, 180; loss of scapulohumeral motion (frozen shoulder), 181; evaluation of pneumarthrographs, 303; tuberculosis of bones and, 375; osteochondrolysis dissecans of knee, 379; arthroplasty and arthrodesis in arthrosis deformans coxae, 382; streptomycin in tuberculosis of bone and, 496; streptomycin in treatment of tuberculosis of bone and, 497; radiohumeral synovitis, 497; chemotherapy and surgical treatment of tuberculosis of bone and, 499; combined surgery and chemotherapy of abscesses in tuberculosis of bone and, 500; radical treatment of tuberculosis of bone and, 500; relationship between articular changes and function, 501; surgical elbow pseudarthrosis for impaired pronation and supination, 581

Jugular vein Internal jugular phlebectasia, 88

KIDNEY, Mesangium of glomerular tuft, its reaction in acute glomerulonephritis and hypertensive nephritis, 57; presence of valvulosphincters at origin of afferent glomerular arterioles in certain mammals, 59; pyelogram in extrarenal tumors, 59; results of experimental renal graft, 59; urologic aspects of arterial hypertension, 67; pathogenesis of acute failure of, associated with traumatic and toxic injury; renal ischemia, nephrotoxic damage, and ischemuric episode, 102; and hypertension, 175; malignant hypertension with unilateral occlusion of artery of, 175; anatomical and clinical observations of case of renal tuberculosis appearing strictly localized at upper pole of; question of partial nephrectomy for tuberculosis of, 175; unilateral pyelonephritis accompanied by hypertension, relieved by nephrectomy, 279; etiology of purpura of bladder and of pelvis of, and apoplexy of urinary bladder and of pelvis of, 279; shunting in human, 309; clinicostatistical study of multiple malignant tumors; renal sarcoma and epithelioma of larynx, 309; renotrophic action of testosterone propionate, 310; renotrophic action of testosterone propionate, 311; structure of glomerular tuft, 368; study of bilateral total adrenalectomy in malignant hypertension and chronic nephritis; preliminary report, 488; studies in pyelorenal backflow, 489; in tourniquet shock, with reference to circulatory changes; experimental study, 490; atrophic pyelonephritis versus congenital renal hypoplasia, 490; aluminum gels with constant phosphorus intake for control of renal phosphatic calculi, 491; perinephric cysts, 492; surgery of horseshoe, 571; new growths of, and ureter, 571; anatomic studies of liver, pancreas and, in postoperative fatalities; contribution to study of hepatorenal syndrome, 597

Knee, Typical pain in, in girls, 73; lesions of semilunar cartilages, 73; result of excision of fractured patella, 75; transplantation of semitendinosus for repair of laceration of medial collateral ligament of, 76; Milch fasciodesis for reconstruction of tibial collateral ligament, 77; surgical treatment of habitual luxation of patella, 80; fascial arthroplasty of, 184; recurrent dislocation of patella, 287; experiences with intramedullary fixation in fusion of, 290; comparative study of arthrography of, 306; osteochondrolysis dissecans of, 379

Korea, Medical air evacuation in, and its influence on future, 591

Krukenberg tumor with primary cancer in breast; study of ovarian metastases of mammary cancer, 476

Kuntscher's nail, With reference to 541 cases of fracture, 287; experiences with intramedullary fixation in knee fusion, 290

LABOR, Vasa previa, 53; present status of midforceps operation, 54; cesarean section death, 54; discussion of further 90 cases of dystocia treated by method of Willet-Gauss, 273; simple method for delivery of arms in breech presentations, 274; limitation of indications for use of forceps at superior strait, 274; symphysiotomy or pubiotomy, 275; modern trends in obstetrical anesthesia, 275; transverse presentation, 364; frequency of maternal deaths, 366; use of posterior pituitary extracts by slow continuous perfusion in treatment of functional dystocias during, 482; Kielland forceps in transverse arrest, 483; continuous caudal anesthesia in, 483; crisis in matter of indications for cesarean section, 570

Labyrinthitis, Suppurative, 236

Lacrimal glands, Dacryocystorhinostomy by intubation, 428

Larynx, Anesthesia for long or technically difficult surgical procedures on eye and, 301; clinicostatistical study of multiple malignant tumors; renal sarcoma and epithelioma of larynx, 309; progress in surgical treatment of bilateral paralysis of, 328

Leather, Place of shoes soled with, in prevention of anesthetic explosions, 401

Leg, Transplantation of semitendinosus for repair of laceration of medial collateral ligament of knee, 76; elephantiasis of lower limbs, 102; chronic edema of lower limbs, 190; torsion of, causing unusual deformity, 290; preoperative phlebography of lower limb, 389; crossed flap procedure, 404; deep venous thrombosis in, following effort or strain, 589

Legg-Perthes disease, 71

Leiomyoma, Leiomyosarcoma of rectum developing from benign, 154

Leiomyosarcoma, Of gastrointestinal tract, 141; of rectum, developing from benign leiomyoma, 154
Lens, Intraocular acrylic; recent development in surgery of cataract, 235; studies on pathogenesis of retrolental fibroplasia, 430
Leucemia, Splenectomy in, and leucosarcoma, 264
Leucosarcoma, Splenectomy in leucemia and, 264
Leucotomy, Study of 238 patients subjected to, 242
Ligament, Transplantation of semitendinosus for repair of laceration of medial collateral, of knee, 76; Milch fasciodesis for reconstruction of tibial collateral, 77
Lip, Repair of unilateral cleft, by stencil method, 119; modern concept of management of cleft, and cleft palate, 237
Lipid, In heterotrophic ossification, 103; constituents of normal bile, 260
Lipoidosis, Proptosis caused by, 115; of tendons, 580
Liver, Duodenitis and Mossé-Marchand-Mallory's cirrhosis, 34; embolic abscess of, following acute appendicitis, 36; differential diagnosis of jaundice by means of function tests of, 39; differential diagnosis of hepatocellular and obstructive jaundice from surgical standpoint, 40; study of syndrome of portal hypertension, 40; portacaval venous shunt, 40; primitive hepatic cancer in pregnancy, 52; benign ulcers of greater curvature associated with ulcerative colitis and cirrhosis of liver, 142; new document on periarterial hepatic neurectomy in treatment of hepatitis, 156; experimental investigation of intrahepatic circulation after arteriovenous hepaticoportal anastomosis, 156; possibilities of angiography of; visualization of portal system, 201; experimental studies on flora of, in man, 258; ligation of common hepatic artery in treatment of cirrhosis; first personal results, 258; regulated right hepatectomy, 258; pathology and treatment of portal hypertension, 350; polycystic disease of; study of 24 cases, 350; hepatic physiology and surgical patient, 351; protection therapy of, in operations on bile ducts, 353; study of morphologic and functional changes in, in posttraumatic states, 466; experimental studies regarding ligature of hepatic artery and anastomosis between hepatic artery and portal vein, 467; thrombosis of hepatic veins; Budd-Chiari syndrome, 471; study of morphologic and functional modifications of, in posttraumatic period, 517; early results following therapeutic ligation of the hepatic artery, 562; anatomic studies of kidneys, pancreas and, in postoperative fatalities; study of hepatorenal syndrome, 597
Lumbosciatalgia, Clinical observations and results of 1,000 operations for, resulting from hernia of intervertebral disc, 183
Lungs, Considerations of group of tuberculous patients operated upon by thoracoplasty, 14; primary anterolateral thoracoplasty; preliminary report, 14; late results in treatment of pulmonary tuberculosis by thoracoplasty, 15; anatomic study, classification, origin, and histogenesis of "air cysts" of, 15; developmental origin of cystic, bronchiectatic, and emphysematous changes in; new concept, 16; treatment of residual post-abscess cavities of, 17; results of surgery for bronchiectasis, 17; extirpation of, in treatment of tumors of, 18; coexistent bronchogenic carcinoma and active pulmonary tuberculosis, 19; bronchial carcinoma; 196 surgical cases, 19; extrapleural pneumothorax by axillary intercostal route, 20; observations on diagnostic value of pulmonary angiography in bronchiogenic carcinoma, 95; maintenance of life by homologous, and mechanical circulation, 104; traumatic bronchial rupture with plastic repair, 127; anomalies of pulmonary veins; their surgical significance, 127; bronchial arteries, their role in pulmonary embolism and infarction, 127; pulmonary decortication in tuberculosis, 128; minute peripheral pulmonary tumors, 128; bronchial "adenoma" treated by local resection and reconstruction of left main bronchus, 128; 5 cases of "adenochondroma" of, 128; bronchogenic carcinoma, 129; bronchogenic carcinoma; its frequency, diagnosis, and early treatment, 129; open pneumonolysis; its value and its limitations, 130; suppurating bronchiogenic cysts, 138; fatal pulmonary emboli; study of 130 autopsy-proved fatal emboli, 192; electrokymographic studies in pulmonary stenosis and tetralogy of Fallot, 199; primary pulmonary tuberculosis as cause of bronchiectasis in children, 245; clinical features of operable and inoperable bronchogenic carcinoma, 245; study to determine effect of prevention of overdistention of remaining tissue of, on elevated right ventricular pressures following resection of tissue of, in dogs, 246; experimental studies of collateral ventilation of, 333; effects upon, of varying periods of temporary occlusion of pulmonary artery, 333; clinical significance of hemoptysis, 334; simple excision in treatment of pulmonary tuberculosis, 334; toxic suppuration of, and endobronchial antibiotic therapy, 335; bronchial adenomas; polypoid tumors of slow evolution, 335; so-called bronchial adenomas are epitheliomas with modified stroma; indications of bronchial tumor with myoepithelial cells, 336; pleuropulmonary resection with hemidiaphragmectomy; preliminary report, 336; researches on arterial oxygen saturation before and after pneumonectomy, 337; hematological changes in patients with congenital cyanotic heart disease who have been subjected to operations designed to improve circulation to, 337; surgical implications suggested by study of 54 anatomical specimens of tetralogy of Fallot, 338; anatomic survey of anomalous pulmonary veins; their clinical significance, 339; case of isolated congenital stenosis of pulmonary artery, 340; cardiovascular repercussions in exeresis of; clinical and experimental study, 402; angiopulmography, 410; roentgenological picture in chronic, nonspecific fibrosis of middle lobe, with regard to value of planigraphy, 410; preparation for bronchiography and local anesthesia of bronchial tree, 442; circulatory and respiratory effects of continuous versus phasic inflation of, in open-chest dogs, 442; cystic pulmonary sequestration with abnormal artery of aortic origin; 6 case reports, 442; actual status of extrafascial apicolysis in surgical treatment of pulmonary tuberculosis, 443; indications and contraindications for decortication procedures in pulmonary tuberculosis, 443; pulmonary functional capacity after lobectomy or segmentary resection in pulmonary tuberculosis, 444; 100 cases of pulmonary extirpation for tuberculosis, 445; pulmonary resection and undecylenic acid in systemic blastomycosis, 446; results in 61 cases of echinococcus cysts of, treated surgically, 447; alveolar cell tumor of, 448; nosology of bronchial epistomas; epitheliomas with transformed stroma, 448; is it possible to determine operability of bronchogenic carcinoma by roentgenologic examination, 449; coverage of bronchial stump with transplanted periosteal flap, 449; physiologic studies following thoracic surgery, 450; encysted pleuropulmonary hematomas, 550; primary carcinoma of, 550; newer palliative measures in management of inoperable bronchogenic carcinoma, 550; pathophysiology of respiration after lobectomy and pulmonectomy, 551; functional problems in cardiac and pulmonary diseases and remarks on surgical intervention, 551; fatal pulmonary embolism in

Heidelberg clinics; (study of 377 cases over a 20 year period), 590; aspiration and aspiration pneumonia, 591; roentgenogram of middle lobe, syndrome, 594
Lymphedema, Elephantiasis of lower limbs, 102
Lymphogranuloma venereum, Granulomatous lesions of anorectal region, 38
Lymphoid tissue, Occurrence of, in urinary organs, 374
Lymphosarcoma, Primary, of stomach, 458, 458; roentgen manifestations of, of stomach, 512
Lymphosarcomatosis, Multiple location in digestive tract of Kundrat's type of, 141
Lymph system, Chronic edema of lower limbs, 190; nitrogen mustard therapy in Hodgkin's disease, lymphoreticulosarcomatosis and lymphatic leucemia, 413
Lysoenzymes, In neoplastic tissue, 414; behavior of, in blood serum of patients suffering from neoplasms, 597

MACULA, Atypical coloboma of choroid with dysplasia of, 5
Madelung's deformity, Etiology and pathogenesis of, 498
Malformations, Double aortic arch, 133; surgical management of congenital, of anus and rectum, 153; hydrocephalic births, 172; neonatal surgery; early treatment of congenital, 197; congenital, of eye induced in mice by maternal anoxia, 232; familial dysgenesis of both elbows; previously unreported congenital disease of extremities, 285
Malignancy, Primary neoplasms of spermatic cord and epididymis: 2 case reports, 66; tumors of testicle, 66; systemic enzyme changes induced by radiation therapy of tumors, 101; multiple primary tumors involving colon and rectum; report of 94 cases, 154; radiation therapy of melanoma, 203; melanoblastoma, 205; synovial sarcoma, with report of 4 cases, 207; clinicostatistical study of multiple tumors; renal sarcoma and epithelioma of larynx, 309; origin and treatment of, of upper jaw and nasal sinuses, 325; melanoma of rectum, 349; results of treatment of ovarian, 359; triethylene melamine therapy in Hodgkin's and other, 413; observations on use of triethylene melamine in neoplastic diseases, 413; comparative cytohistological study of tumors; phase-contrast picture, 414; degeneration of gastric ulcers, 457; diagnosis and management of uterine, 472; present status of exfoliative cytology in diagnosis of gastrointestinal, 560
Mandible, Treatment of bilateral fractures of edentulous, 8; fractures of; their orthodontic treatment, 322; plasmacytoma of, 323; treatment of tumors of inferior alveolus and, 427
Massage, Cardiac resuscitation; collective review, 313
Mastoidectomy, 118
Maxilla, Maxillofacial injuries, 1; management of cleft palate cases involving hard palate so as not to interfere with growth of, 119
Maxilla, Osteomyelitis of, 322
Meconium, Tryptic activity and cornified squamae in, as diagnostic aid in congenital obstruction, 145
Mediastinum, In syndrome of adhesive pericarditis, 23; surgical treatment of tumors of, 26; observations and semeiotic stratigraphic notes concerning adenopathies of, 96; mediastinal gastric cyst; successful excision in 8-week-old infant, 143; esophagus and lymphadenopathy of, in bronchial carcinoma, 199; tuberculoma of, 249; intrathoracic cysts of, and their classification, 342; paramediastinal cyst containing parotid enzymes; differential diagnosis of cysts of, and their surgical therapy, 456
Megacolon, in adult, 257
Melanoblastoma, 205; and its therapy; experiences with irradiation at close range, 100
Melanoma, Malignant, of rectum, 349; possible malignant, of choroid, 544
Ménière's disease, Viewpoints on operative treatment in, 432
Meningioma, Intraventricular, simulating pituitary tumor, 11
Meningioma, Roentgenologic aspects of, 511
Menstruation, Endocrine therapy in treatment of functional amenorrhea and functional oligohypomenorrhea, 270
Mercury, Eye changes following exposure to metallic, 233
Mesangium of glomerular tuft; its reaction in acute glomerulonephritis and hypertensive nephritis, 57
Mesentery, Angiomatous enterocyst of, 147; so-called arteriomesenteric duodenal obstruction, 461; thrombosis of, following blunt abdominal trauma, 555
Metabolism, Nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209; effects on, of anesthesia in man, 302; parathyroid glands; collective review, 417; postoperative potassium deficit and alkalosis; pathogenic significance of operative trauma and of potassium and phosphorus deprivation, 507
Metastases, Diagnosis of osseous, from cancer of prostate and Paget's disease, 64
Methonium, Preliminary report on use of compounds of, and general anesthesia in ophthalmic surgery, 5
Methyl cellulose, Plasma expanders; collective review, 521
Metrorrhagia, Nonblastomatous postmenopausal; clinical considerations, 478; etiology of periodical, or false menstruation of pregnancy; its relationship to disease conditions, 569
Minerals, Nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209
Mole, Anatomopathologic and clinical considerations of deciduoma malignum of uterus, 170
Mouth, Treatment of bilateral fractures of edentulous mandible, 8; squamous cell carcinoma of floor of, 238; indications for radical surgery in treatment of head and neck cancer, 433; application of combined hemimandibulectomy and neck dissection to carcinoma of, 543; treatment of oroantral fistula, 545
Mucosa, Observations of, of cervical canal in gynecologic lesions, 359
Muscles, Retroplacement of inferior oblique at its scleral insertion, 5; value of orthoptics in treatment of squint, 324; case of myositis ossificans with calcific deposits in conjunctiva of possible hyperparathyroid origin, 519
Mutation, Genetic aspects of radiation risks, 595
Myasthenia gravis, Ablation of mediastinal tumor of thymus and of hyperplastic thymus gland, 205; thymectomy in treatment of, 250
Myeloma, Variations in roentgen appearance of skeletal system in, 202
Myoblastoma, Tumor of male urethra; of perineal portion of urethra, 494
Myofibroma, Causes of mortality in supravaginal abdominal hysterectomy for, 360
Myoma, Uterus with complicated by pregnancy, 172
Myomectomy, Results of, by hemostatic technique of Borrás, 267; surgical technique and results in series of 1,150 cases, 359
Myositis ossificans, Case of, with calcific deposits in conjunctiva of possible hyperparathyroid origin, 519

NASOPHARYNX, Lesions of, in sarcoidosis, 199
Neck, Simultaneous bilateral radical dissection of, with recovery; report of 2 cases, 10; subacute thyroiditis, 120; branchial cysts and fistulas; study of 75 cases

relative to clinical aspects and treatment, 122; treatment of cervicofacial actinomycosis with regard to penicillin therapy, 239; injuries of cervical spine treated by wire extension through skull, 330; new hazard in cervical laminectomy, 438; management of cancer of head and, by general surgeon, 543; application of combined hemimandibulectomy and dissection of, to oral carcinoma, 543; combined operations in management of cancer of head and, 545

Necrosis, Avascular, of bone, 71; aseptic osseous, 384; extensive, of skin and subcutaneous tissue after local anesthesia with usual novocain-adrenalin solution, 401; experimental cerebral radionecrosis produced by contact roentgen therapy, 593

Nerves, Extratemporal repair of facial; case reports, 124; neurovascular mechanism and control of intraocular pressure, 233; effect of sclerosis of, on ascent of tetanus toxin in sciatic, of rabbits and on development of local tetanus, 416; management of traumatic lesions of facial, 437

Nervous system, Anesthesia by controlled inhibition of autonomic, 194; chemical, histopathological, and electroencephalographic basis of dynamic theory of general anesthesia, 298

Neurofibroma, Cervical, in differential diagnosis of carotid body tumor, 545

Neurofibromatosis, Intestinal form of, of Recklinghausen, 414

Neuromas, Discussion on origin of so-called amputation, after cholecystectomy, 158

Neurosurgery, With reference to, for pain amelioration in instances of incurable genital carcinoma: experience with sacral resection of hypogastric and pelvic nerves according to Thiermann, 271

Newborn, Asphyxia of, 55; treatment of acute congenital occlusions of intestine, 145; neonatal surgery: early treatment of congenital malformations, 197; traumatisms of, 276; postthemorrhagic shock in, 276; antenatal prediction of hemolytic disease of, 277; treatment of hemolytic disease of, 277; functional evaluation of adrenal cortex in, 311; eosinophile response in, and pregnancy at term, 312; diagnosis and treatment of hemolytic disease of, 364; results of treatment of hemolytic disease of, 365; pathology of fetal and neonatal asphyxia, 483; fetal anoxia, with review of cases, 484

Nipple, Bleeding from, 126

Nitrogen, Experimental evaluation of effectiveness of pancreatin in reducing loss of fecal, and fat following total gastrectomy, 159

Nitrogen mustard therapy in Hodgkin's disease, lymphoreticulosarcomatosis and lymphatic leucemia; results of treatment, 413

Nose, Severe bleeding of, and its treatment, 8; experiences in use of general anesthesia for corrective rhinoplasty, 195; management of recent fractures of, 236; congenital dermoid cysts of, 237; intranasal encephaloceles, 237; intranasal chondrosarcoma, 544

Novocain, Intravenous use of, in medicosurgical practice, 310

Novocain-adrenalin, Extensive necrosis of skin and subcutaneous tissue after local anesthesia with usual solution of, 401

Nuclear reactions, Acute radiation syndrome; study of 9 cases and review of problem, 203

Nutrition, Parenteral, with solution containing 1,000 calories per liter, 91; following total gastrectomy with reference to fat and protein assimilation; collective review, 209; amblyopia, 428; roentgen findings in instances of "digestive megasplanchnia," 594

OBESITY, Treatment of maternal, 363

Obstetrics, Venous thrombosis in, and gynecology, 46; clinical reports of Rotunda Hospital, Coombe Lying-In Hospital, and National Maternity Hospital, 56; clinical review of thrombocid, synthetic heparin, in, and gynecology, 366; use of curare locally in surgery and, 400; preventive medicine in, 486

Oddi's sphincter, Roentgenologic demonstration of active emptying function of, 407

Oleogranulomas, Of rectum following rectal instillation of petrolatum or ointments containing petrolatum, 154

Omentum, Torsion, infarction, and hemorrhage of, as cause of acute abdominal distress, 43

Omphalomesenteric duct, Open, 29

Operation, Importance of blood volume studies in management of surgical patients, 91; fluctuations in number of eosinophils in blood after, 192; device producing regulated assisted respiration, prevention of hypoventilation and mediastinal motion during intrathoracic surgery, 196; T-piece technique for general inhalational anesthesia, 196; electrolytes in surgery, 207; elderly surgical patient, 309; cardiac resuscitation; collective review, 313; analyses of 221 patients with goiter who were subjected to, 327; posture and approach in thoracic surgery, 343; hepatic physiology and surgical patient, 351; liver protection therapy in, on bile ducts, 353; plasma proteins after, 394; protein deficit in surgery, 394; evaluation of capillary permeability in collapse after, and its treatment with saline infusions, studied by hematocrit-protein diagram, 395; use of curare locally in surgery and obstetrics, 400; prevention and treatment of disturbances of cardiac rhythm registered by electrocardiography during surgery of heart, 402; transdiaphragmatic gastrectomy, 459; complaints after gastric, 460; information furnished by introduction in course of, of opaque media into pancreatic duct by its drainage and by study of pancreatic secretion, 471; experience with Le Fort-Neugebauer's, for complete prolapse; 58 cases, 472; major, in old people, 505; water and electrolyte balance in surgery, 505; observations on water intoxication in surgical patients, 506; role of anticoagulant therapy in surgery, 507; replacement of gastric and intestinal fluid losses in surgery, 508; surgical use of ACTH and cortisone, 517

Orbit, Implants for; review of results obtained at Moorfields branch of Moorfields, Westminster, and Central Eye Hospital, London, 115; periorbital tumors, 116; auscultation of, as diagnostic method in unilateral exophthalmos, 323

Orthopedic surgery, Homoplastic bone granulate as implantation material in, 587; repair of soft tissue in traumatic surgery and, 591

Os calcis, Early mobilization in treatment of fractures of, 387

Ossification, Lipids in heterotrophic, 103

Osteitis, Postoperative, of pubic bone; study of 20 cases, 281; unilateral limb lengthening associated with hematogenous, in childhood, 286

Osteochondritis, Pathogenesis and classification of, 283

Osteochondritis dissecans, Pathogenesis of, 180; with spontaneous healing, 180; spontaneous cure of, 180; multiple hereditary disturbances of epiphyses and, 305

Osteogenesis, Potency for, and new-bone formation by induction in transplants to anterior chamber of eye, 387

Osteoma, Osteoid, 205

Osteomyelitis, Of maxilla, 322; new method in treatment of hematogenous, 387; resection of diaphysis of long tubular bones in hematogenous acute suppurative 499

Osteoporosis, Painful, of pubis 66

Otosclerosis, Closed method of fenestration, 7; genesis of, 7
Ovary, Influence of ultrasonic energy on structure of, (experimental study), 104; thecocellular tumors of, 166; homologous tumors of, and testicle, 166; carcinoma of, 202; results of treatment of malignancies of, 359; functional tumors of, 476; dysgerminoma of, 476; Krukenberg tumor with primary cancer in breast; metastases of mammary cancer in, 476; pregnancy in, 480; experimental investigation on genesis of tumors of, 567
Oxygen, Researches on arterial saturation of, before and after pneumonectomy, 337; fetal anoxia, 484
Oxypolygelatin, Plasma expanders; collective review, 521

PAGET'S disease, Diagnosis of osseous metastases from cancer of prostate and, 64
Pain, Surgery of, in incurable cancer, 11; in breast, 13; in carcinoma of breast, 13; chemical nerve block for amelioration of, in cases of inoperable genital carcinoma, 271; neurosurgical amelioration of, in instances of incurable genital carcinoma: experience with sacral resection of hypogastric and pelvic nerves according to Thiermann, 271; non-neurological lesions simulating protruded intervertebral disc, 289
Palate, Management of cases of cleft, with involvement of hard, so as not to interfere with growth of maxilla, 119; bone flap technique in surgery of cleft, 119; modern concept of management of cleft lip and cleft, 237; corrective procedures after operations for harelip or cleft jaw and, 326
Pancreas, Acute necrosis of; etiology and pathogenesis, 43; cystadenoma of, 43; direct roentgenologic demonstration of, 98; islet-cell tumor of, 161; islet-celled tumor of, with unusual clinicopathological features, 262; carcinoma of, 262; observations on resection of head of, 263; nonpenetrating abdominal trauma, with reference to lesions of duodenum and, 264; aberrant; cause of duodenal syndrome, 354; 2 cases of cancer of, simulating chronic pancreatitis and idiopathic sprue, 357; roentgenologic findings accompanying carcinoma of, 407; 2 contributions on injuries of, with suggestion of predigestion of food by duodenal juice of relatives in absence of digestive ferments of stomach, liver, and, 469; islet-cell tumors of, 470; primary reticulosarcoma of, 471; islet-cell adenoma of, 563; anatomic studies of liver, kidneys and, in postoperative fatalities; study of hepatorenal syndrome, 597
Pancreatic duct, Information furnished by introduction in course of operation of opaque media into, by its drainage and by study of pancreatic secretion, 471
Pancreatin, Experimental evaluation of effectiveness of, in reducing fecal nitrogen and fat loss following total gastrectomy, 159
Pancreatitis, Pathogenesis of acute, 160; choice of therapeutic measures in management of chronic relapsing, and pancreatolithiasis, 160; current concepts, 355; serum amylase levels in experimental, 357; role of trypsin in pathogenesis of acute hemorrhagic, and effect of antitryptic agent in treatment, 357; treatment of experimental acute with banthine, 357; compression of common bile duct by chronic, 468; experimental production of, with ethionine 469; acute; significance of associated hypertension, 563
Papillomatosis, Cystectomy in invasive-infiltrative, of urinary bladder and of juxtavesical portions of ureters, 368
Paralysis, Transient monocular blindness associated with hemiplegia, 2; due to antirabies vaccine, 93; attempts to treat cerebrovascular accidents and their sequelae, 123; progress in surgical treatment of bilateral laryngeal, 328; serum polyneuritis following tetanus antitoxin with unusual localization of, and late injury, 399; paresis of abducens nerve following spinal anesthesia, 400; epidemic infantile, in pregnancy and childbirth, 481
Paraplegia, Indications for neurosurgical establishment of bladder automaticity in, 62; scoliosis complicated by, 82
Parathyroid glands, Cysts of, 9; collective review, 417; tumoral calcinosis which was greatly improved by thymoparathyroidectomy; study of calcium balance after minimal intake, 518; case of myositis ossificans with calcific deposits in conjunctiva of possible hyperparathyroid origin, 519; primary hyperparathyroidism, 519
Parotid gland, Tumors of, 115; sialography of, 198; operative removal of tumors of, 543
Patella, Result of excision of fractured, 75; surgical treatment of habitual luxation of, 80; recurrent dislocation of, 287; results of chondrectomy in chondromalacia of, 379
Pectin, Plasma expanders; collective review, 521
Pelvis, Phlebography of, by transosseous route, 46; surgery of advanced cancer of, in women, 49; follow-up studies following total viscerectomy of, 162; presentation of rapid sequence phlebography of, on film strips; technical, physiologic, and clinical conclusions, 269; fractures of neck of femur following irradiation of, 286; studies on angiography of, in women, 477
Penicillin, Treatment of cervicofacial actinomycosis with regard to therapy with, 239
Pepsin, Studies on secretion of, 252
Pericarditis, Ballistocardiogram in constrictive, before and after pericardiectomy, 23; mediastinal component in syndrome of adhesive, 23; constrictive; etiology; clinical history of 4 cases of tuberculous, including 2 cases of constrictive type, 134; constrictive, and constrictive pleuritis treated by pericardiectomy and pulmonary decortication, 134; present day surgical concepts in chronic constrictive, 248; etiology and prognosis of constrictive, 453
Perineum, Present treatment of diffuse periurethral phlegmon, 577
Peripheral nerves, Injuries of, 125; regeneration of, in experimental hypothyroidism, 242
Peritoneum, Oil granuloma of, 251
Peritonitis, Terramycin in treatment of, 139; alterations in clinical course of diffuse, of genital origin; report of 7 cases, 478
Perthes disease, Operative treatment of, by means of boring and pegging, 75
Petrolatum, Oleogranulomas of rectum following rectal instillation of petrolatum or ointments containing, 154
Pharynx, Cancer of hypopharynx and its surgical treatment, 545
Phase-contrast procedure, Comparative cytohistological study of malignant tumors; picture shown by, 414
Pheochromocytoma; Negative benzodioxane test in presence of, 279; diagnosis and treatment, 367; case report of successful thoracoabdominal operation after 9 negative surgical explorations, 487
Phlebectasia, Internal jugular, 88
Phlebogram, Diagnostic value of, in intermittent obstruction of subclavian vein, 189
Phlebothrombosis, Silicone-tube coagulation time as aid in diagnosis of, 87
Phlegmon, Present treatment of diffuse periurethral, 577
Phosphorus, Parathyroid glands; collective review, 417
Pilonidal sinus, Pathology of interdigital, 412
Pineal gland, Studies regarding determination of normal location of, on normal craniogram, 95

Pituitary gland, Tumors of, and its environs, 124; symptoms and treatment of tumors of, 437; use of extracts of posterior lobe of, by slow continuous perfusion in treatment of functional dystocias during labor, 482; general review of Sheehan's syndrome, 599
Placenta, Circulation of; maternal and fetal, 55; calcification of, in roentgen pregnancy study, 202; disturbances of coagulation of blood in cases of severe premature separation of, 363; diffuse reticulohemangioendothelioma of, with polyhydramnios and celomic monster exhibiting multiple malformations, 482
Placenta previa, 51; 11-year review, 172
Plasma, Variations of coagulation time of heparinized, following delivery, 54; present status of volume expanders of, in treatment of shock, 92; proteins of, after operation, 394; expanders of; collective review, 521
Plasmacytoma, Solitary, 103; of mandible, 323; multiple myeloma and trauma, 597
Plastic surgery, Treatment of bilateral fractures of edentulous mandible, 8; management of cleft palate cases involving hard palate so as not to interfere with growth of maxilla, 119; repair of unilateral cleft lip by stencil method, 119; bone flap technique in cleft palate surgery, 119; traumatic bronchial rupture with, 127; modern concept of cleft lip and cleft palate management, 237; cross-finger flaps in treatment of injuries to finger tip, 302; use of temporary polythene shunts and frozen homologous graft replacement of major arterial segments in traumatic and malignancy surgery, 391; mass treatment of burns in atomic warfare, 397; cross-leg flap procedure, 404; complete avulsion of scalp, 427; surgical construction of conjunctival cul-de-sac and preferred methods for partial or total socket restoration, 430; use of tantalum wire and mesh for abdominal repair by, 457; elementary technique of repair of cutaneous losses of fingers, 509; production of ectopic cartilage, 519; transplantation studies on sheets of pure epidermal epithelium and on epidermal cell suspensions, 520; secondary contracting tendency of free skin grafts, 520; of trachea and bronchi, 549
Pleura, Pleuropulmonary resection with hemidiaphragmectomy; preliminary report, 336
Pleuritis, Constrictive pericarditis and constrictive, treated by pericardiectomy and pulmonary decortification, 134
Pneumarthrographs, Evaluation of, 303
Pneumonia, Aspiration and aspiration, 591
Pneumothorax, Extrapleural, by axillary intercostal route, 20; spontaneous contralateral, complicating thoracic surgical procedures, 130
Poliomyelitis, Local stimulation of growth of long bones, 70; certain procedures for surgical rehabilitation of hand in, 381; epidemic infantile paralysis in pregnancy and childbirth, 481
Polyps, Gastric, 144; multiple; results of fulguration of, in distal portion of colon after ileosigmoidostomy and colectomy, 149; intussusception of ureter associated with benign, 370; adenomatous of colon and rectum, 561
Polythene, Substitution of extrahepatic biliary ducts with tubes of, 43; use of temporary shunts of, to permit occlusion, resection, and frozen homologous graft replacement of vital vessel segments, 292; observations on use of temporary shunts of, and frozen homologous graft replacement of major arterial segments in traumatic and malignancy surgery, 391
Polyvinyl alcohol, Plasma expanders; collective review, 521
Polyvinylpyrrolidone (PVP), Shock therapy with intraperitoneal infusion of blood volume replenishers; dextran and, 92; plasma expanders; collective review, 521
Potassium, Postoperative deficit of, and metabolic alkalosis; pathogenic significance of operative trauma and of deprivation of, and phosphorus, 507
Pregnancy, Diagnosis and management of ectopic, 50; roentgenography in hemoperitoneum of tubal, 50; clinical report on toxemias of, 51; retinal changes in toxemias of, 51; placenta previa, 51; primitive hepatic cancer in, 52; habitual abortion, 53; trends in therapeutic abortion; review of 137 cases, 53; vasa previa, 53; myomatous uterus complicated by, 172; placenta previa; 11-year review, 172; study of circulation of amniotic fluid in man, 173; regulatory and adaptative factors in intrauterine fetal development, 173; placental calcification in roentgen study of, 202; hydration treatment of eclampsia, 273; practical experiences with interruption of, and sterilization in familial erythroblastosis, 273; endometrial tuberculosis and completed, 277; duration of, and postmaturity, 277; eosinophile response in newborn and, at term, 312; treatment of maternal obesity, 363; disturbances of coagulation of blood in cases of severe premature separation of placenta, 363; endometriosis in; clinical observations, 364; nonfatal case of amniotic fluid embolism, 365; ovarian, 480; hypertensive toxemias of, 480; toxemic accidental hemorrhage, 480; etiology of pre-eclampsia eclampsia, 481; associated with congenital abnormalities of female reproductive tract, 481; epidemic infantile paralysis in, and childbirth, 481; diffuse reticulohemangioendothelioma of placenta with polyhydramnios and celomic monster exhibiting multiple malformations, 482; rhesus factor (D) at Maternity Department of University of Louvain; results of prenatal investigation and technique of exchange transfusion treatment, 485; fetal infections, 485; etiology of periodical metrorrhagia or false menstruation of; its relationship to disease conditions, 569; considerations on pathogenesis of varicosities during 569; chronic ulcerative colitis and, 569; Hodgkin's disease in; with report of 12 cases, 570
Presentations, Simple method for delivery of arms in breech, 274; transverse, 364; Kielland forceps in transverse arrest, 483
Priscoline, Intra-arterial therapy with, for peripheral vascular disturbances, 503
Propylthiouracil, Observations on use of, in hyperthyroidism with reference to long term treatment, 121
Prostatectomy, Osteoporosis dolorosa of pubis, 66; report on 100 cases of retropubic, (Millin), 372
Prostate gland, Diagnosis of osseous metastases from cancer of, and Paget's disease, 64; diseases of, and bladder; present day management, 178; proctologic manifestations of carcinoma of, 280; retropubic surgery in benign lesions of, 281; late results of perurethral resection of, 281; urethral rupture at apex of, 494; carcinoma of, with reference to hormonal treatment, 494; cancer of, 578
Prostheses, Indications and results of arthroplastic, in malum coxae, 381
Protein, Nutrition following total gastrectomy with reference to assimilation of fat and; collective review, 209; curves of concentration of red cells, activity of cholinesterase in serum, and after gynecologic interventions, 269; experimental study of assimilation of, and fat after total gastrectomy, 347; plasma, after operation, 394; deficit of, in surgery, 394; combined

effect of cortisone and partial depletion of, on wound healing, 509
Prothrombin, Mechanism of blood coagulation; historical review and outline of modern concepts; collective review, 105; relations between time for action of, and thromboplastin after splenectomy; experimental and clinical study, 162
Pseudoglioma, 117
Psychosis, Anterior cingulectomy in treatment of mental disease, 242
Pubes, Osteoporosis dolorosa of, 66; postoperative osteitis of; study of 20 cases, 281
Pubiotomy, Symphysiotomy or, 275
Puerperium, Variations of coagulation time of heparinized plasma following delivery, 54; level of prothrombinemia and thromboplastic factors following delivery, 55; pathogenetic considerations of thrombophlebitis of upper extremity in, 56; general review of Sheehan's syndrome, 599
Purpura, With reference to etiology of, of bladder and of renal pelvis and to apoplexy of urinary bladder and renal pelvis, 279
Pyelogram in extrarenal tumors, 59
Pyelonephritis, Atrophic, versus congenital renal hypoplasia, 490
Pylorus, Functional conditions of, with emphasis on achalasia and acleisia, 97; perigastric adhesions and bands involving antrum of, 200; relation of gastric secretion to events following obstruction of, 344; clinicoroentgenologic considerations on permanent prolapse of gastric adenoma through, 457

RADIATION, Hazards of, to embryo and fetus, 305; studies on nature of hemorrhagic state in injury due to, 410; physical characteristics of, in cobalt^{60} beam therapy, 411; injury to small intestine from, 461; clinical possibilities of cobalt^{60} beam unit, 515; cytological and cytochemical approach to understanding of damage in dividing cells from, 515; treatment of infection after, with antibiotics; experimental study on mice, 516; experimental cerebral radionecrosis produced by contact therapy, 593; genetic aspects of risks from, 595; hemorrhagic phase of acute syndrome of, due to exposure of whole body to penetrating ionizing, 596
Radiation syndrome, Acute; study of 9 cases and review of problem, 203
Radiation therapy, Response of human tissues to radiation with reference to differentiation, 99; of malignant melanoma, 203; reconstruction of injuries following excessive, 403
Radioactivity, Detection of intraocular tumors with phosphorus having, 117; employment of iodine with, in storage test for diagnosis of thyroid diseases, 120; uptake of phosphorus with, in normal brain and brain tumors, 123
Radionecrosis, Hysterographically visualized, following intrauterine radiation of cancer of corpus of uterus, 408
Radium, Sexual life of patients with carcinoma of cervix cured by irradiation, 45; development of clubfoot due to disturbance of epiphysial growth following treatment with, of hemangioma, 98; limitations of histology in prognosis of radiation-treated cancer, 204; cancer of gums, 238; fractures of neck of femur following irradiation of pelvis, 286; pathological study of retinoblastoma treated by radon seeds and discs of, 432
Radius, Madelung's deformity; etiology and pathogenesis, 498
Radon, Pathological study of retinoblastoma treated by seeds of, and radium discs, 432
Rectum, Rectosigmoidectomy for Hirschsprung's disease, 37; double tumor of, and colon, 38; some observations on treatment of carcinoma of, 38; granulomatous lesions of region of, and anus, 38; anal canal and, 153; surgical management of congenital malformations of anus and, 153; oleogranulomas of, following rectal instillation of petrolatum or ointments containing petrolatum, 154; multiple primary malignant tumors involving colon and; report of 94 cases, 154; total extirpation in treatment of cancer of, and personal technique, 154; leiomyosarcoma of, developing from benign leiomyoma, 154; value of routine anosigmoidoscopy as diagnostic procedure in general practice, 154; anterior resection of carcinoma of, 257; carcinoma rising in adenomas of colon and, 349; malignant melanoma of, 349; new point of view on operative treatment of prolapse of, 464; carcinoma of rectosigmoid and upper part of, 465; extirpation of, by sacroabdominal approach, 466; adenomatous polyps of colon and, 561; cancer of, 562; construction of sphincter of, and restoration of anal continence by transplanting the gracilis muscle, 562
Rehabilitation of amputee, 81
Respiration, Anesthesia for surgical correction of cardiorespiratory anomalies, 402; circulatory effects and, of continuous versus phasic lung inflation in open-chest dogs, 442; physiologic studies following thoracic surgery, 450; pathophysiology of, after lobectomy and pulmonectomy, 551
Resuscitation, Comments on death and, after electric shock in New Zealand, 93; cardiac; collective review, 313
Reticulosarcoma, Of cecum, 463; primary, of pancreas, 471
Retina, Changes in, in toxemias of pregnancy, 51; subclinical detachments of, 431; experiences with tumors of, 431
Retinoblastoma, Pathological study of, treated by radon seeds and radium discs, 432
Rhesus factor (D) at Maternity Department of University of Louvain; results of prenatal investigation and technique of exchange transfusion treatment, 485
Rhinoplasty, Experiences in use of general anesthesia for corrective, 195
Ribs, Spontaneous fractures of both first, 549
Roentgenography, Struma lymphomatosa (Hashimoto's struma); review of 51 cases with discussion of endocrinologic aspects, 9; diagnosis of gliomas by combined electroencephalographic and angiographic studies, 11; complications of gastrointestinal diverticula demonstrated by, 29; angulations of gallbladder, 41; venograms found in connection with hysterosalpingography, 45; pelvic phlebography by transosseous route, 46; urologic aspects of endometriosis; renal, ureteral, and vesical forms, 48; in hemoperitoneum of tubal pregnancy, 50; direct and retrograde aortography, 84; studies regarding determination of normal location of pineal gland on normal craniogram, 95; further observations on diagnostic value of pulmonary angiography in bronchiogenic carcinoma, 95; observations and semeiotic stratigraphic notes concerning mediastinal adenopathies, 96; functional conditions of pylorus with emphasis on achalasia and acleisia, 97; direct demonstration of pancreas, 98; second report on diverticulosis of colon; differential diagnosis, 148; control by manometry and, of biliary tract during operation, 155; stratigraphic study of optic canal, 198; sialography of parotid gland, 198;

nasopharyngeal lesions in sarcoidosis, 199; electrokymographic studies in pulmonary stenosis and tetralogy of Fallot, 199; esophagus and mediastinal lymphadenopathy in bronchial carcinoma, 199; perigastric adhesions and bands involving pyloric antrum, 200; clinical studies on use of controlled intragastric pressure for, of lesions in and about fundus of stomach, 201; possibilities of angiography of liver; visualization of portal system, 201; placental calcification in pregnancy study with, 202; retropneumoperitoneum applied to study of suprarenal gland, 202; variations in appearance of skeletal system in myeloma, 202; presentation of rapid sequence pelvic phlebography on film strips; technical, physiologic, and clinical conclusions, 269; differential diagnosis of congenital and of acquired vertebral synostoses, 285; evaluation of pneumarthrographs, 303; thoracic aortography, with reference to its value in patent ductus arteriosus and coarctation of aorta, 303; topographic and morphologic modifications of gastrointestinal tract produced by extrinsic tumors, 304; multiple hereditary disturbances of epiphyses and osteochondrosis dissecans, 305; x-ray visualization of intervertebral disc, 305; comparative study of arthrography of knee joint, 306; translumbar arteriography: its interpretation, 306; use of angiography in diagnosis of space-occupying intracranial lesions, 329; uncommon compressing lesions of spinal cord and its membranes, 330; unusual variant of double aortic arch, 340; segmental atrophic gastritis; differentiation from early stage of stomach cancer, 345; translumbar arteriography in urology, 373; results of chondrectomy in chondromalacia of patella, 379; tibia vara (osteochondrosis deformans tibiae), 380; preoperative phlebography of lower limb, 389; stereomicroradiography, 405; cranial clues to intracranial abnormality, 405; factors influencing filling of anterior cerebral artery in arteriography, 405; symmetrical calcification in cerebellum, 406; thrombotic occlusion of aorta as demonstrated by translumbar aortograms, 406; prolapse of gastric mucosa into duodenum, 406; demonstration of active emptying function of Oddi's sphincter, 407; findings accompanying carcinoma of pancreas, 407; diagnosis of tuberculous endometritis, 408; hysterographically visualized radionecrosis following intrauterine radiation of cancer of corpus of uterus, 408; urologic problems in pediatric diagnosis by, 408; of tumor infiltration of wall of urinary bladder, 409; arthrography of shoulder, 409; angiopulmography, 410; in chronic nonspecific fibrosis of middle lobe, with regard to value of planigraphy, 410; preparation for bronchiography and local anesthesia of bronchial tree, 442; is it possible to determine operability of bronchogenic carcinoma by, 449; value of cholangiograms during biliary tract surgery, 468; information furnished by introduction in course of operation of opaque media into pancreatic duct, by its drainage, and by study of pancreatic secretion, 471; preliminary studies on pelvic angiography in women, 477; aspects of meningiomas, 511; angiocardiography in congenital heart disease of cyanotic type, 511; of lymphosarcoma of stomach, 512; lesions of upper gastrointestinal tract in infants and children, 512; emergency diagnosis of upper digestive tract bleeding by, without palpation: Hampton technique, 513; fractures of neck of femur, 514; brain tumors in children, 593; of middle lobe syndrome, 594; findings in instances of digestive megasplanchnia, 594; emergency, in severe hemorrhages of gastroduodenal origin, 595; vertebra plana totalis, 595

Roentgen therapy, Sexual life of patients with carcinoma of cervix cured by irradiation, 45; experiences in treatment of skin cancer with ultrasoft rays; 1933–1936, 98; results of treatment of skin cancer with ultrasoft, given in single dose, 98; regeneration and –SH changes in guinea pig skin after, 100; melanoblastoma and its therapy; experiences with, at close range, 100; observations on 68 seminoma patients with or without metastases; after hemicastration, 100; systemic enzyme changes induced by, of malignant tumors, 101; of chorioepithelioma; report of 2 cases (1 with pulmonary metastasis) with 10 year follow-up, 278; fractures of neck of femur following irradiation of pelvis, 286; clinical experience with, through grid, 307; recent clinical experience with grid in, of advanced cancer, 308; newer palliative measures in management of inoperable bronchogenic carcinoma, 550

SACRUM, Relationship between sacroiliac junction and spinal deformities, 379

Salt, Preoperative and postoperative parenteral maintenance of electrolyte balance with mixture of, containing sodium, potassium, chloride, and phosphate, 192

Sarcoidosis, Nasopharyngeal lesions in, 199; ocular; report of 3 cases, 324

Sarcoma, Uterine, 165; of cytogenic chorion; of endometrium, 165; synovial; with report of 4 cases, 207; and its relation to sex, 415; osteogenic, of breast, 440

Scalenus muscle, On syndrome of, 125

Scalp, Complete avulsion of, 427

Schistosomiasis mansoni, Spinal cord involvement by, 548

Scoliosis, Complicated by paraplegia, 82; prophylaxis of, 182

Secretions, Importance of duodenopancreaticobiliary, in pathogenesis of gastroduodenal ulcers: therapeutic conclusions, 345

Seminoma, Observations on 68 patients with, and with or without metastases, irradiated after hemicastration, 100

Serum, Curves of concentration of proteins, red cells, and activity of cholinesterase in, after gynecologic interventions, 269; amylase levels in, in experimental pancreatitis, 357; parathyroid glands; collective review, 417; method for determination of antibacterial potency of, during therapy of acute infections, 509; behavior of lysoenzymes in blood, of patients suffering from neoplasms, 597.

Sex, Sarcomas and their relation to, 415

Sexual function, Influence of lumbar sympathetic chain resection upon, 331

Sheehan's syndrome, General review of, 599

Shock, Therapy of, with intraperitoneal infusion of blood volume replenishers, dextran and PVP, 92; present status of plasma volume expanders in treatment of, 92; comments on death and resuscitation after electric, in New Zealand, 93; posthemorrhagic, in newborn, 276; vasomotor reflexes of carotid sinus in experimental traumatic, 309; restoration of blood volume in seriously injured patients, 393; early recognition and management of, 395; evaluation of capillary permeability in postoperative collapse and its treatment with saline infusions, studied by hematocrit-protein diagram, 395; limitations and dangers of fluid replacement therapy, 396; pathogenesis of experimental, due to ice (cold), 412; study of morphologic and functional changes in liver in posttraumatic states, 466; plasma expanders; collective review, 521; reanimation with endocarotid transfusion in a cranial direction, 590

Shoes, Place of leather-soled, in prevention of anesthetic explosions, 401
Shoulder, Our method for operative treatment of recurrent dislocation of, 78; loss of scapulohumeral motion; frozen, 181; practical method for extra-articular fusion of, in tuberculosis, 183; arthrography of, 409
Sinus, Origin and treatment of malignant disease of upper jaw and nasal, 325; pathology of interdigital pilonidal, 412; treatment of antro-oral fistula with reference to use of streptokinase and streptodornase, 432; local use of streptokinase-streptodornase in chronic refractory areas of suppuration with draining, 510; treatment of oroantral fistula, 545
Skin, Some immunological aspects of autografts and homografts in rabbits tested by in vivo and in vitro techniques, 93; effect of desensitization of donor, and ACTH on survival of homografts in rabbits, 94; experiences in treatment of cancer of, with ultrasoft roentgen rays, 1933–1936, 98; results of treatment of cancer of, with ultrasoft roentgen rays given in single dose, 98; regeneration and –SH changes in guinea pig, after x-ray treatment, 100; primary graft of, following excision of fistula-in-ano, 155; effect of ACTH on autogenous and homologous grafts of, in rabbits, 208; recovery of nervous function in transplants of, with reference to sympathetic functions, 310; elementary technique of repair of cutaneous losses of fingers, 509; treatment of carcinoma of, 514; secondary contracting tendency of free grafts of, 520; experimental study of effects of freezing; partial dehydration and ultrarapid cooling on survival of dog grafts of, 520
Smears, Use of vaginal, as a screening test, 568
Sodium fluorescein, Use of, and atabrine in diagnosis of tumors, 205
Spasm, Physiology and relief of traumatic arterial, 86; vascular, 88
Spermatic cord, Tumors of; review of literature and report of 2 cases, 66; primary malignant neoplasms of, and epididymis: 2 case reports, 66
Sphincter, Presence of valvelike, at origin of afferent glomerular arterioles in certain mammals, 59
Spinal cord, Vertebral fractures with exposed, 124; uncommon compressing lesions of, and its membranes, 330; effect of transection on ascent of tetanus toxin in rabbit's, 416; new hazard in cervical laminectomy, 438; intramedullary tumor; its diagnosis and surgical treatment, 438; intraspinal lesions simulating protruded intervertebral discs, 548; involvement of, by schistosomiasis mansoni, 548
Spine, Lame back; some common causes and conservative treatment, 72; experimental investigations into physical properties of intervertebral disc, 82; prophylaxis of scoliosis, 182; clinical observations and results of 1,000 operations for lumbosciatalgia resulting from hernia of intervertebral disc, 183; differential diagnosis of congenital and of acquired vertebral synostoses, 285; injuries of cervical, treated by wire extension through skull, 330; study of late results from disc operations, 330; surgical approach in lumbar and lumbothoracic sympathectomies, 331; relationship between sacroiliac junction and spinal deformities, 379; surgical interventions on paravertebral tuberculous abscesses, 500; treatment of abscesses associated with tuberculosis of, 580; new aspects of surgical treatment in cases of severe curvatures of, 582; vertebra plana totalis, 595
Spleen, Cysts of; report of case, 161; surgery of, 263; splenectomy in leucemia and leucosarcoma, 264; puncture of, 563; surgical aspects of hypersplenism, 564
Splenectomy, Relations between prothrombin time and thromboplastin time after splenectomy; experimental and clinical study, 162; indications for, and technique of, 358
Springs, Arthrodesis of ankle joint by, 77
Sprue, Two cases of cancer of pancreas simulating chronic pancreatitis and idiopathic, 357
Staphylococci, Prevention of infection of thoracic surgical wounds by, from patient's skin, 137
Stereomicroradiography, 405
Sterility, Problems of conjugal, 167
Sterilization, Practical experiences with interruption of pregnancy and, in familial erythroblastosis, 273
Steroids, Surgical treatment of hyperfunctioning lesions of adrenal cortex, 175
Stomach, Effect of Exalto-Mann-Williamson procedure on secretion of, 29; immediate subtotal gastrectomy for acute perforated peptic ulcer, 31; results of partial gastrectomy for peptic ulcer, 31; is it necessary to continue dietary treatment after gastric resection for ulcer of, and duodenum, 32; development of cancer in gastric ulcer, and ulcer symptoms in gastric cancer, 32; carcinoma of, 32; colonic replacement of, 33; new method of cytological diagnosis in diseases of, 142; benign ulcers of greater curvature associated with ulcerative colitis and cirrhosis of liver, 142; postoperative icterus following resection of, for duodenal ulcer, 143; mediastinal cyst of; successful excision in 8-week-old infant, 143; gastric polyps, 144; mesenchymal tumors of, 145; perigastric adhesions and bands involving pyloric antrum, 200; clinical studies on use of controlled intragastric pressure for roentgen diagnosis of lesions in and about fundus of, 201; etiopathogenesis of anemia in diaphragmatic hernia of, 252; studies on pepsin secretion, 252; gastroesophageal reflux, 253; giant hypertrophic gastritis, 253; surgical intervention in massive gastroduodenal bleeding, 253; remote results in resections for gastroduodenal ulcers, 254; benign tumors of, 254; total gastrectomy for cancer; technique and results, 254; account of gastroduodenal anatomy of importance in palliative resection of, 254; incidence and mechanism of early dumping syndrome after gastrectomy, 255; volvulus of, 344; relation of gastric secretion to events following pyloric obstruction, 344; electrolyte abnormalities in pyloric obstruction resulting from peptic ulcer or gastric carcinoma, 345; segmental atrophic gastritis: radiologic differentiation from early stage of cancer of, 345; prolapse of gastric mucosa into duodenum, 406; clinicoroentgenologic considerations on permanent prolapse of gastric adenoma through pylorus, 457; malignant degeneration of gastric ulcers, 457; primary lymphosarcoma of, 458, 458; transdiaphragmatic gastrectomy, 459; complaints after gastric operations, 460; achlorhydria following gastric resection, 460; roentgen manifestations of lymphosarcoma of, 512; arterial blood supply of human, 555; massive hypertrophic gastritis, 555; segmental gastric resection for peptic ulcer, 556; indications for surgical treatment of gastric and duodenal ulcers and their complications, 556; results of vagotomy during 7 years, 558
Strabismus, Role of heredity in etiology and treatment of, 3; surgical treatment of esotropia with bilateral evaluation in adduction, 3; value of orthoptics in treatment of squint, 324; electroencephalographic changes in, 428
Streptodornase, Treatment of antro-oral fistula with reference to use of streptokinase and, 432; local use of streptokinase and, in chronic refractory areas of suppuration with draining sinuses, 510

Streptokinase, Treatment of antro-oral fistula with reference to use of, and streptodornase, 432; local use of, and streptodornase in chronic refractory areas of suppuration with draining sinuses, 510
Streptomycin, Treatment of tuberculous bone disease by surgical drainage combined with, 375; in bone and joint tuberculosis, 496; in treatment of bone and joint tuberculosis, 497; evaluation of therapy with, in controlled series of 90 cases of skeletal tuberculosis, 497
Struma lymphomatosa, (Hashimoto's struma); review of 51 cases with discussion of endocrinologic aspects, 9
Sulfonamides and antibiotics in trachoma, 429
Sympathectomy, New document on periarterial hepatic neurectomy in treatment of hepatitis, 156; problems of ischemia of lower extremity, 187; role of, in arteriosclerosis obliterans, 188; surgical approach in lumbar and lumbothoracic, 331; nonthrombotic obstruction of venous circulation of upper arm; therapeutic value of venoclysis and perivenous; Paget-Schroetters' syndrome, 389
Sympathetic nerves, Surgery of pain in incurable cancer, 11; recovery of nervous functions in skin transplants, with reference to functions of, 310; influence of resection of lumbar, upon sexual function, 331
Symphysiotomy or pubiotomy, 275
Synovitis, Radiohumeral, 497

TALUS, Traumatic necrosis of, 581
Tantalum, Use of wire and mesh of, for plastic abdominal repair, 457
Tendons, Simple suture for repair of, to bone, 81; stenosing tenovaginitis at wrist and fingers, 498; lipoidosis of, 580; experimental investigations of mechanism of spontaneous rupture of, 587
Terramycin, Influence of, on course of experimental ocular tuberculosis, 2; in treatment of peritonitis, 139; and aureomycin in surgical infections; report of 200 cases, 509
Testicle, Malignant tumors of, 66; homologous tumors of ovary and, 166; luxations of, 372; treatment of ectopia of; results observed in 132 patients, 578; tumors of, 579
Testosterone propionate, Renotrophic action of, 310; renotrophic action of, 311
Tetanus, Serum polyneuritis following antitoxin for, with unusual localization of paralysis and late injury, 399; effect of sclerosis of nerve trunk on ascent of toxin of, in sciatic nerve of rabbits and on development of local, 416; effect of transection on ascent of toxin of, in rabbit's spinal cord, 416
Tetany, Disappearance of, and anemia after resection of blind loop of intestine, 146; parathyroid glands; collective review, 417
Tetralogy of Fallot, Electrokymographic studies in pulmonary stenosis and, 199; surgical implications suggested by study of 54 anatomical specimens of, 338
Thoracoplasty, Considerations of group of tuberculous patients operated upon by, 14; primary anterolateral; preliminary report, 14; late results in treatment of pulmonary tuberculosis by, 15
Thorax, Observations and semeiotic stratigraphic notes concerning mediastinal adenopathies, 96; open pneumonolysis; its value and its limitations, 130; spontaneous contralateral pneumothorax complicating surgical procedures in, 130; cardiostathorrhaphy; splinting flaccid myocardium of coronary occlusion by surgical procedures, 132; responsibility of physician in selection of patients with mitral stenosis for surgical treatment, 132; constrictive pericarditis and constrictive pleuritis treated by pericardiectomy and pulmonary decortication, 134; prevention of infection of surgical wounds of, by staphylococci from patient's skin, 137; traumatic chylothorax, 137; present position of anesthesia for surgery of, 195; device producing regulated assisted respiration, prevention of hypoventilation and mediastinal motion during surgery of, 196; esophageal atresia accompanied by remarkable vessel anomaly, 248; pleuropulmonary resection with hemidiaphragmectomy; preliminary report, 336; posture and approach in surgery of, 343; general anesthesia in open surgery of, 399; repair of experimental tracheal defects with fresh and preserved homologous tracheal grafts, 440; circulatory and respiratory effects of continuous versus phasic lung inflation in open-chest dogs, 442; coverage of bronchial stump with transplanted periosteal flap, 449; physiologic studies following surgery of, 450; benign tumors of portion of esophagus in, 455; management of chest injuries, 456; encysted pleuropulmonary hematomas, 550; spontaneous laceration of esophagus, 553
Thrombin, Effect of sutures and of, upon healing of ocular wounds, 6
Thrombin degradation test, according to Lenggenhager; clinical and experimental studies, 598
Thrombocid, Clinical review of, (synthetic heparin) in obstetrics and gynecology, 366; experimental studies on animals regarding circulatory action of synthetic anticoagulant, 598; studies on vasculoactive component of, 599
Thrombophlebitis, Pathogenetic considerations with reference to puerperal, of upper extremity, 56
Thromboplastin, Relations between time for action of prothrombin and thromboplastin after splenectomy; experimental and clinical study, 162
Thrombosis, 297; venous, in obstetrics and gynecology, 46; sequelae of deep, in lower limbs, 87; chronic, of common and external iliac veins, left common iliac origin of phlebothrombosis said to be of lower extremities, 189; venous, and its treatment with anticoagulants, 295; increase of postoperative, and embolism and their management with anticoagulants, 362; treatment and prophylaxis of, and embolism with dicumacyl; problems and results, 396; occlusion of aorta due to, as demonstrated by translumbar aortograms, 406; of hepatic veins; Budd-Chiari syndrome, 471; results in systematic prevention and treatment of, and embolism with anticoagulants, 479; mesenteric, following blunt abdominal trauma, 555; deep venous, in leg following effort or strain, 589
Thumb, Trigger, simulating paralysis, 82; reconstruction of, 289
Thymus gland, Myasthenia gravis; ablation of mediastinal tumor of, and of hyperplastic, 205; thymectomy in treatment of myasthenia gravis, 250
Thyroid gland, Struma lymphomatosa (Hashimoto's struma); review of 51 cases with discussion of endocrinologic aspects, 9; employment of radioiodine storage test for diagnosis of diseases of, 120; observations on use of propylthiouracil in hyperthyroidism with reference to long term treatment, 121; conservative reconstruction of tracheal collapse following surgery of, 121; peripheral nerve regeneration in experimental hypothyroidism, 242; carcinoma of, and nontoxic nodular goiter, 326; analyses of 221 patients with goiter who were subjected to surgery, 327; use of antithyroid drugs in hyperthyroidism, 433; results in treatment of hyperthyroidism with radioiodine, I^{131}, 433; great practical value of auscultation of, for diagnosis of Graves' disease, 434; physiologic concepts of tumors of, as revealed with newer tools of study, 434; radio-

iodine in treatment of metastatic carcinoma of, 435; recurrent nodular goiter in children, 545
Thyroiditis, Subacute, 120
Thyroxin, Effect of, on experimental fractures in dogs, 311
Tibia, Congenital kyphoscoliotic, 499; fractures of shaft of, and fibula, 586; conservative treatment of fractures of plateau of, 586; treatment of fractures of external condyle of, 587
Tibia vara (osteochondrosis deformans tibiae), 380
Tongue, Cancer of, 239
Toxemia, Clinical report on, of pregnancy, 51; retinal changes in, of pregnancy, 51; hypertensive, of pregnancy, 480; accidental hemorrhage; review of 100 cases, 480
Toxins, Pathogenesis of acute renal failure associated with injury due to trauma and; renal ischemia, nephrotoxic damage and ischemuric episode, 102
Trachea, Conservative reconstruction of collapse of, following surgery of thyroid, 121; repair of experimental defects of, with fresh and preserved homologous grafts of, 440; use of viable pedicle graft for repairing extensive defect of, and bronchus, 441; carcinoma of intrathoracic; excision and repair with tantalum gauze-fascia lata graft, 441; plastic reconstruction of, and bronchi, 549; open closure of bronchus and resection of carina and of wall of, 550
Trachoma, Sulfonamides and antibiotics in, 429
Transfusion, intra-arterial-infusion; simplified technique, 590
Trauma, Pathogenesis of acute renal failure associated with injury due to, and toxins; renal ischemia, nephrotoxic damage and ischemuric episode, 102; study of morphologic and functional modifications of liver in period after, 517; plasmocytoma (multiple myeloma) and, 597
Trichomonas, Diagnosis and treatment of vaginitis specific and aspecific for, 268
Triethylene melamine, Therapy with, in Hodgkin's and other malignant diseases, 413; further observations on use of, in neoplastic diseases 413; in treatment of neoplastic disease, 518
Trigger-thumb simulating paralysis, 82
Trochanter, Pertrochanteric and subtrochanteric fractures, 584
Trypsin, Role of, in pathogenesis of acute hemorrhagic pancreatitis and effect of antitryptic agent in treatment, 357
Tuberculoma, Mediastinal, 249
Tuberculosis, Influence of terramycin on course of experimental ocular, 2; considerations of group of patients with, operated upon by thoracoplasty, 14; late results in treatment of pulmonary, by thoracoplasty, 15; coexistent bronchogenic carcinoma and active pulmonary, 19; ureterectomy with ureterocystoanastomosis in tuberculous stenosis of lower portion of ureter, 61; terminal stenosing ureteritis due to, 61; enterocystoplasty for small bladder after nephrectomy for tuberculosis, 63; multiple cystic, 71; pulmonary decortication in, 128; constrictive pericarditis; etiology; clinical history of 4 cases of pericarditis due to, including 2 cases of constrictive type, 134; anatomical and clinical observations of case of renal, appearing strictly localized at upper kidney pole; question of partial nephrectomy for renal, 175; urogenital; review of 209 surgically treated cases, 179; practical method for extra-articular shoulder fusion in, 183; primary pulmonary, as cause of bronchiectasis in children, 245; endometrial, and completed pregnancy 277; treatment of, of male genitalia; considerations arising from study of 1,650 cases in 25 years of practice, 282; simple excision in treatment of pulmonary, 334; results of medical and medicosurgical therapy in urogenital, 373; of bones and joints, 375; treatment of bone disease by surgical drainage combined with streptomycin, 375; roentgen diagnosis of endometritis due to, 408; actual status of extrafascial apicolysis in surgical treatment of pulmonary, 443; indications and contraindications for decortication procedures in pulmonary, 443; pulmonary functional capacity after lobectomy or segmentary resection in pulmonary, 444; 100 cases of pulmonary extirpation for, 445; streptomycin in bone and joint, 496; streptomycin in bone and joint, 497; evaluation of streptomycin therapy in controlled series of 90 cases of skeletal, 497; chemotherapy and surgical treatment in bone and joint, 499; combined surgery and chemotherapy of abscesses in bone and joint; early results, 500; surgical interventions on paravertebral abscesses in, 500; radical treatment of bone and joint, 500; of breast, 549; treatment of abscesses associated with spinal, 580
Tubes, Experimental study of restoration of continuity of large blood vessels by means of plastic, 390; use of, constructed from vinyon "N" cloth in bridging arterial defects, 391
Tumors, Extirpation of lung in treatment of, of lung, 18; surgical treatment of, of mediastinum, 26; double, of rectum and colon, 38; pyelogram in extrarenal tumors, 59; of spermatic cord; review of literature and report of 2 cases, 66; solitary plasmocytoma, 103; of parotid gland, 115; periorbital, 116; of pituitary body and its environs, 124; ultropak and doubtful, of breast, 126; minute peripheral pulmonary, 128; mesenchymal, of stomach, 145; clinical findings in cases of benign, of fundus of gallbladder, 158; angiocholitic type of, of Vater's ampulla treated by cephalic duodenopancreatectomy, 159; islet-cell, of pancreas, 161; thecocellular, of ovaries, 166; homologous ovarian and testicular, 166; study of, of vascular sheaths, 187; use of sodium fluorescein and atabrine in diagnosis of, 205; carotid body, 240; benign, of stomach, 254; islet-celled, of pancreas with unusual clinicopathological features, 262; topographic and morphologic modifications of gastrointestinal tract produced by extrinsic, 304; primary epithelial, of ureter, 370; giant-cell, of bone, 377; roentgenographic signs of infiltration of wall of urinary bladder by, 409; lysoenzymes in neoplastic tissue, 414; treatment of, of inferior alveolus and mandible, 427; experiences with, of retina, 431; physiologic concepts of thyroid, as revealed with newer tools of study, 434; symptoms and treatment of pituitary, 437; intramedullary; diagnosis and surgical treatment, 438; rare benign of breast, 440; benign, of thoracic portion of esophagus, 455; islet-cell, of pancreas, 470; functional, of ovary, 476; experiences with benign bone, in pediatric practice, 513; triethylene melamine in treatment of neoplastic disease, 518; operative removal of, of parotid salivary gland, 543; expanding intracranial lesions in childhood, 548; intraspinal lesions simulating protruded intervertebral discs, 548; successful removal of, of heart, 552; the nonspecific inflammatory ileocecal, 566; recent experimental investigation on genesis of ovarian, 567; new growths of kidney and ureter, 571; testicular, 579; brain in children, 593; behavior of lysoenzymes in blood serum of patients suffering from, 597
Tween 80, Nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209
Typhlitis, Sclerohypertrophic, 255

ULCER, Surgical treatment of peptic, 30; comparison of results in personally studied cases in which gastric vagotomy was performed with those reported to American Gastroenterological Association, 30; results of partial gastrectomy for peptic, 31; immediate subtotal gastrectomy for acute perforated peptic, 31; development of cancer in gastric; and symptoms of, in gastric cancer, 32; is it necessary to continue dietary treatment after gastric resection for ulcer of stomach and duodenum, 32; results of surgical treatment of colitis due to, 37; benign, of greater curvature associated with colitis and cirrhosis of liver, 142; hemorrhage from peptic; analysis of 223 cases, 142; 10 years' experience with bleeding peptic, with emphasis on 45 fatal cases, 143; postoperative icterus following gastric resection for duodenal, 143; fatality due to hemorrhage from duodenal, in burn case, 254; remote results in resections for gastroduodenal, 254; electrolyte abnormalities in pyloric obstruction resulting from peptic, or gastric carcinoma, 345; importance of duodenopancreaticobiliary secretions in pathogenesis of gastroduodenal; therapeutic conclusions, 345; intravascular agglutination and vascular stasis in peptic, 346; acute, and hemorrhages of gastrointestinal tract, 346; surgical treatment of peptic, 346; treatment of choledochoduodenal fistulas due to, 353; gastroenterostomy in surgical treatment of gastroduodenal, 457; malignant degeneration of gastric, 457; basic principles in surgical treatment of duodenal, 462; segmental gastric resection for peptic, 556; indications for surgical treatment of gastric and duodenal, and their complications, 556; selection of patients with duodenal, for vagotomy, 557; results of vagotomy during 7 years, 558; surgical treatment of chronic colitis with, 560

Ultrasonic energy; Effects of, on refractive media of eye, 5; influence of, on structure of ovary (experimental study), 104

Umbilical cord, Congenital enteroumbilical fistula due to patent vitelline duct, 140

Undecylenic acid, Pulmonary resection and, in systemic blastomycosis, 446

Ureter, Granuloma of, 60; squamous cell carcinoma occurring in stump of chronically infected, many years after nephrectomy, 61; ureterectomy with ureterocystoanastomosis in tuberculous stenosis of lower portion of, 61; plastic operations on; end-results following various methods of anastomosis, 176; anastomosis of, with intestines, 176; cystectomy in invasive-infiltrative papillomatosis of urinary bladder and of juxtavesical portions of, 368; megaloureter; new concept in treatment, 369; ectopic openings of, 369; intussusception of, associated with benign polyp, 370; diverticulum of; report of another authentic case, 370; primary epithelial tumors of, 370; primary carcinoma of, 370; injury of, by transurethral electroresection and coagulation, 372; compression of, by traction diverticulum of duodenum, 492; section of inferior vena cava for retrocaval; new method of treatment, 492; biochemical changes after ureterocolic anastomosis of, with colon, 494; new growths of kidney and, 571; new concept of etiology of megaloureters, 573; management of injuries of, 573

Ureteritis, Terminal stenosing tuberculous, 61

Urethra, Congenital stricture of membranous, 64; primary carcinoma of female, 271; primary carcinoma of male, 371; tumor of male; myoblastoma of perineal portion of, 494; rupture of, at apex of prostate, 494; method of retrograde passing of probe in impermeable posttraumatic strictures of, 576; operative treatment of strictures of, 577

Urinary tract, Urologic aspects of endometriosis: renal, ureteral, and vesical forms, 48; results of experimental renal graft, 59; role of ammonia reabsorption in acid-base imbalance following ureterosigmoidostomy, 62; enterocystoplasty for small bladder after nephrectomy for tuberculosis, 63; antibacterial management of infections of, 67; plastic operations on ureter; end results following various methods of anastomosis, 176; results of medical and medicosurgical therapy in urogenital tuberculosis, 373; occurrence of lymphoid tissue in, 374; problems pertaining to, in pediatric x-ray diagnosis, 408; studies in pyelorenal backflow, 489; surgery of horseshoe kidney, 571; management of ureteral injuries, 573; physiology of transitional epithelium of; vesical secretion in dog, 574; problem of nonopaque stone of, 574; trigonal cystectomy, 574; method of retrograde passing of a probe in impermeable posttraumatic strictures of urethra, 576; operative treatment of urethral strictures, with report of method used in 18 cases, 577

Urine, Role of protective colloids in, in prevention of renal lithiasis, 491

Urogenital system, Tuberculosis of; review of 209 surgically treated cases, 179

Urology, Extradural spinal anesthesia according to Buchholz and Lesse in operations and comparison of its results with those of peridural anesthesia, 67; translumbar arteriography used in series of 100 cases, 373

Uterus, Morbidity studies in 1,000 consecutive hysterectomies, 45; venograms found in connection with hysterosalpingography, 45; ruptured endometrial cysts as cause of acute abdominal symptoms (endometrial pelviperitonitis), 45; cytodynamic properties of human endometrium, 163; treatment of complete prolapse of, 163; perforation of, 163; therapy of cancer of, 164; study of cancers of; value of suction biopsy in their diagnosis (report of 33), 164; sarcoma of, 165; anatomopathologic and clinical considerations with reference to deciduoma malignum of, 170; involution of cervix, 266; fibromyoma of, in adolescents, 266; actual concept of treatment of cervical cancer, 266; can results of irradiation in cancer of cervix of, be improved by prophylactic hysterectomy, 266; carcinoma of cervical stump after subtotal hysterectomy, 267; results of myomectomy by hemostatic technique of Borrás, 267; treatment of residual stump following total abdominal hysterectomy, simple or extended, 268; endometrial tuberculosis and completed pregnancy, 277; investigations into mucosa of, 359; observations of mucosa of cervical canal in gynecologic lesions, 359; myomectomy; surgical technique and results in series of 1,150 cases, 359; causes of mortality in supravaginal abdominal hysterectomy for myofibroma, 360; urologic complications of cancer of cervix of, 374; roentgen diagnosis of tuberculous endometritis, 408; hysterographically visualized radionecrosis following intrauterine radiation of cancer of corpus of, 408; treatment of cancer of, with radioactive cobalt (Co^{60}), 411; experience with Le Fort-Neugebauer's operation for complete prolapse; 58 cases, 472; differential diagnosis of dystrophic states and cervical epitheliomas; study of glycogen; uncertainty of smears, 472; diagnosis and management of malignancy of, 472; early diagnosis of cervical cancer and its treatment in noninvasive stage, 473; preinvasive carcinoma of cervix, 474; results of treatment of cancer of cervix of, (with reference to 1,374 cases at Anticancer Center, Lyons, France), 475; use of vaginal smear as a screening test, 568

VACCINE, Neuroparalysis due to antirabies, 93
Vagina, Cytology of, in diagnosis and therapy of hypophyso-ovarian dysfunction, 270; vesicovaginal fistulas, 360
Vaginitis, Diagnosis and treatment of, specific and aspecific for trichomonas, 268
Vagotomy, Comparison of results in personally studied cases in which gastric, was performed with those reported to American Gastroenterological Association, 30; selection of duodenal ulcer patients for, 557; results of, during 7 years, 558
Varices, Venous pressure in, of lower extremities, 190; modern trends in treatment of, 295; congenital, of esophagus, 453; considerations on pathogenesis of, during pregnancy, 569
Vas deferens, Anastomosis operations on, 281
Vater's ampulla, Angiocholitic type of tumor of, treated by cephalic duodenopancreatectomy, 159
Vein, Use of intrailiac blood transfusion in cases of impassable, 89; anomalies of pulmonary; their surgical significance, 127; diagnostic value of phlebographic pictures in "intermittent obstruction of subclavian, 189; chronic thrombosis of common and external iliac; left common iliac origin of phlebothrombosis said to be of lower extremities, 189; modern trends in treatment of varicose, 295; thrombosis of, and its treatment with anticoagulants, 295; anatomic survey of anomalous pulmonary; their clinical significance, 339; nonthrombotic obstruction of circulation of, of upper arm; therapeutic value of venoclysis and perivenous sympathectomy; Paget-Schroetters' syndrome, 389; experimental studies on ligature of hepatic artery and anastomosis between hepatic artery and portal, 467
Vena cava, On ligation of inferior, in cardiac insufficiency, 295; section of inferior, for retrocaval ureter; new method of treatment, 492
Ventigrator, Device producing regulated assisted respiration; prevention of hypoventilation and mediastinal motion during intrathoracic surgery, 196
Ventilation, Experimental studies of collateral, of lungs, 333; researches on arterial oxygen saturation before and after pneumonectomy, 337
Ventricle, Heart with single, 130; cardiac catheterization in congenital heart disease; direct demonstration of single, 131
Virus, Why are antibiotics ineffective against infections due to, 597
Viscerectomy, Follow-up studies following total pelvic, 162
Vitamins, Nutrition following total gastrectomy with reference to fat and protein assimilation; collective review, 209; response of dicumarol-induced hypoprothrombinemia to vitamin K, 412
Vitreous body, Phase contrast microscopy of animal, 232
Vulva, Treatment of cancer of, 166

WAR, Traumatic arteriovenous fistulas and aneurysms in wounded in, 388; abdominal wounds in jungle, 565; medical air evacuation in Korea and its influence on future, 591
Water And electrolyte balance in surgery, 505; observations on intoxication due to, in surgical patients, 506
Weather, Biometeorologic effect on genesis of appendicitis, 348
Wheal test, Clinical tests for evaluation of circulation in tubed pedicles and flaps, 197
Wounds, Effect of sutures and of thrombin upon healing of ocular, 6; 127 penetrating, of abdomen, 44; present status of treatment of frostbite, 193; treatment of burns, 298; pathogenesis and treatment of severe burns, 397; study of several recent publications on severe burns, 398; rehabilitation of patients with deep burns, 403; reconstruction of injuries following excessive radiation therapy, 403; further studies on nature of hemorrhagic state in radiation injury, 410; compound, of hand, 508; combined effect of cortisone and partial protein depletion on healing of, 509; abdominal, in jungle warfare, 565; repair of soft tissue in orthopedic and traumatic surgery, 591
Wrist Congenital osseous anomalies of carpus; synostosis congenita bilaterale of semilunar and pyramidal bones, 377; stenosing tenovaginitis at, and fingers, 498; results of insertion of cancellous bone in cases of pseudarthroses of carpal navicular, 581; carpometacarpal dislocations; total dislocations, 583

AUTHOR INDEX—ABSTRACTS—VOLUME 95

Aaron, Jules B., 172
Abbasciano, S., 312
Abeatici, S., 201
Abelson, Denis, 279
Acquati Angelo, 254, 457
Actis-Dato, A., 132
Adams, A. Wilfrid, 492
Adams, William E., 246
Adie, George C., 13, 15
Aikat, B. K., 103
Aitken, Alexander P., 78
Albertengo, Juan B., 438
Albot, Guy, 25, 258, 345
Aldes, John H., 580
Allen, Duff S., 132
Allen, Herman L., 94
Allgöwer, M., 93
Almeida, Ary Lopes de, 469
Alnor, P., 331
Alvarez-Ierena, J. Jose, 490, 574
Amendola, Frederick H., 253
Ammon, Guenter, 89
Amreich, I. A., 270
Amspacher, William H., 521
Andersen, Ib., 410
Andersen, Preben Thestrup, 410
Anderson, James R., 280
Andersson, Ture, 199
Andrews, Carl E., 104
Angelino, P. F., 132
Anlyan, William G., 357, 461
Annan, Cornelius M., 295
Anselmino, K. J., 271
Anttinen, Johannes E., 64
Appelmans, R., 254
Archer, G. E., 236
Arduino, Elio, 147
Argent, J., 54, 55
Argüelles, M. Blanco, 587
Arkin, Alvin M., 182
Arons, Isidore, 413
Arrau, Carlos Meza, 563
Arrowood, Julia G., 196
Artz, Curtis P., 139, 509
Aschan, Gunnar Kison, 325
Ask-Upmark, Erik, 323
Asper, Samuel P., Jr., 121
Astrup, E. Carsten, 137
Atkins, H. J. B., 13
Aubry, P., 401
Auchincloss, Hugh, Jr., 31
Aufses, Arthur H., 245
Aulong, J., 583

Bacon, Harry E., 153, 154
Baden, Helge, 42
Badgley, Carl E., 499, 586
Badin, J., 54
Báez, Juan José, 274
Bailey, M. K., 279
Baird, Dugald, 486
Baker, B. M. Jr., 23
Baker, G. P., 39
Baker, William J., 178
Balás, Attila, 389
Ball, Heinz, 353
Banche, M., 460
Banerji, B. N., 34, 255
Banks, Henry, 442
Banner, Edward A., 172
Barbera, Giovanni, 242
Barclay, Stephen, 121
Bariatti, R., 156
Barrett, N. R., 565
Barry, A. P., 56
Barry, Arthur P., 275
Barshay, Bernard, 19
Barss, Theodore P., 302
Barter, Robert H., 172
Barton, W. Bruce, 518
Basto, E. Lima, 459
Bastrup-Madsen, Poul, 206
Battistelli, Ugo Filippini, 103
Baty, John A., 565
Bauer, K. H., 466
Baumgartner, O., 383
Baxter, Hamilton, 288
Bayçu, Turhan, 297
Baylis, J. H., 416, 416
Beach, Edward W., 374
Beams, Argyle J., 252
Beatrice, E., 333
Beattie, Edward J., Jr., 134, 296
Beaumont, J.-L., 295
Becker, F., 155
Beeler, John W., 407
Beilly, Jacob S., 172
Belding, Hiram H., III, 30
Beling, C. Abbott, 309
Bell, George O., 519
Bell, Julius W., 236
Bellegie, Nicholas J., 465
Ballerio, L., 310, 311
Bembridge, B. A., 232, 234
Benchimol, Aarão B., 130
Bengle, Armand L., Jr., 302
Benichoux, R., 298
Bennett, H. Stanley, 251
Bennett, Van, 324
Beno, Thomas J., 130
Benson, Clifford D., 462
Bérard, M., 442
Berckmans, E., 283
Berens, Conrad, 5, 430
Berglund, Fredrik, 133
Bergman, Harry, 66
Berman, Jacob K., 599
Bernhart, G., 566
Bernstein, Sidney A., 501
Berthet, Georges, 25
Bertrand, I., 593
Bertrand, Pierre, 582
Betzler, H. J., 415
Bevis, D. C. A., 277
Bichel, J., 413
Bichel, Jørgen, 206
Biel, J. M., 569
Bieniarz, Jozef, 173
Bifani, I., 358
Billingham, R. E., 520
Billings, Carl E., 67
Bimes, C., 164
Binkley, Frank C., 514
Binkley, George E., 349
Biraben, 126
Bischofberger, C., 74
Bishop, P. M. F., 53
Björk, Viking Olov, 550
Blacket, R. B., 246
Blades, Brian, 296, 555
Blakemore, Arthur H., 391
Blanchard, Oscar, 476
Blocker, T. G., Jr., 93
Bloom, Walter L., 403
Blount, Walter P., 75
Blum, E., 48, 175
Bobbio, Antonio, 18
Bocci, Adriano, 268
Boehmer, Walter, 67
Boerger, G., 453
Boguñá, Isidro, 267
Boichev, B., 78
Bond, Wm. H., 142
Bonduelle, M., 11
Bonta, Joseph A., 42
Booher, Robert J., 159
Book, Donald T., 252
Boonants, J., 27
Borden, Craig W., 89
Borghetti, U., 327, 400
Borow, L. S., 303
Borsay, J., 580, 587
Borsotti, P. C., 463
Bosch, Donald T., 309
Bosch, Rodolfo Gonzalez, 93
Bost, J., 588
Bosworth, David M., 76, 496
Bottin, Jean, 43
Boulvin, R., 40
Bourg, R., 476
Bourne, Geoffrey, 452
Bousquet, Franklyn P. Jr., 430
Bowman, T. L., 264
Bowyer, Charles M., 5
Boyce, William H., 62, 371
Bozzola, Jose A., 93
Bradley, K. C., 547
Bradshaw, H. H., 449
Braitenberg, H., 481
Braithwaite, James L., 493
Brantigan, O. C., 127
Brantigan, Otto C., 441
Branwood, A. Whitley, 262
Brecher, George, 596
Brenier, J. L., 266
Bret, 165
Brewer, Lyman A., III, 136
Brezing, Herman J., 15
Brilmayer, Carlheinz, 205
Brintnall, E. S., 162
Brinton, W. D., 337
Broadbent, T. Ray, 562
Brockhurst, Robert J., 432
Brodén, Bror, 303
Brogly, G., 298
Brombart, M., 253
Bronkhorst, W., 445
Bross, Heinrich, 372
Brown, Harold, 563
Brown, Ivan W. Jr., 520
Brown, James Barrett, 403
Brown, John Reid, 555
Brown, William E., III, 562
Browne, O'Donel, 56, 480
Bruce, T., 130
Brunge, A., 483
Brunschwig, A., 258
Bruzzone, P. L., 453
Bryant, Milton F., Jr., 562
Bucaille, Maurice, 461
Buecherl, Emil, 598, 599
Bullough, John, 196
Bumm, E., 40
Burger, Paul, 482
Burlaud, R., 599
Burwell, C. Sidney, 134
Butler, Olive, 38
Butt, Arthur, J., 491
Butterfield, W. J. H., 404
Byrne, John Joseph, 192

Cabanie, H., 463
Cahan, Alvin M., 442
Cahan, William G., 441
Cahill, George F., 367
Caldarola, L., 590
Callahan, Alston, 4
Camp, J. D., 548
Campbell, James S., 573
Campbell, John C., 370
Campbell, Robert M., 50
Campi, L., 201
Canga, S. H., 297
Cangelosi, Joseph P., 92
Canon, R., 484
Cantinieaux-Duwaerts, S., 402
Capalbi, Stefano, 2
Carasso, R., 34, 141
Carlens, Eric., 550
Carothers, Ralph G., 387
Carpenter, Earnest B., 586
Carroll, Walter W., 543
Carter, Bayard, 360
Carvaillo, M. R., 345
Casella, Philip A., 61, 92
Caserta, John A., 295
Casolo, P., 358
Cassebaum, William H., 185
Castellano, Francesco, 547
Cataldi, Gaetano, 359
Cathro, Arthur J. McG., 492
Cator, 126

Cattan, R., 34, 141
Cattaneo, Piero, 273
Cattell, Richard B., 148,160
Cauchoix, J., 386
Cave, Edwin F., 80
Cebul, Frank A., 261
Cerise, Elmo J., 326
Cernès, M., 269
Cervantes, Carlos, 73
Cetroni, M. B., 46
Chaffin, Lawrence, 462
Chalek, Jack I., 202
Chambers, John W., 547
Chambers, Robert G., 13
Chambraud, M. R., 46
Chambraud, R., 269
Chamichian, Souren, 5
Chapman, T. L., 281
Charbon, Bernard C., 246
Charlier, R., 340
Chatelin, Ch., 468
Chatterjea, Jyoti B., 563
Chavany, J.-A., 11
Chenoweth, Arthur I., 562
Chesterman, J. T., 17
Chevalier, J., 588
Chevalier, M., 40
Chevallier, A., 311
Chikiamco, Paterno S., 278
Child, Charles G., III, 351
Childress, William G., 15
Chinn, Austin B., 252
Chippaux-Mathis, 44
Choyce, D. P., 115
Christophe, Louis, 452
Chwalla, Rudolf, 279
Cianci, Salvatore, 170
Cibert, J., 281
Cigorraga, Eduardo, 93
Cilberti, Benjamin J., 401
Ciminata, A., 360
Clark, Chester E., 47
Clarke, James S., 344
Clarke, S. H. C., 140
Clarke, T. Howard, 115
Claude, F., 401
Clerc, R., 155
Clercx, L., 267
Cliffton, Eugene E., 357
Cochran, J. B., 161
Coe, John D., 559
Colcock, Bentley P., 150
Cole, Helen Grady, 5
Cole, Warren H., 207
Collenet, J., 281
Coller, Frederick A., 562
Collins, E. N., 251
Collins, Vincent. J., 590
Colombo, C., 333
Colp, Ralph, 34
Comfort, Mandred W., 350
Condorelli, Luigi, 23
Confalonieri, A., 373
Conley, John J., 427
Contreras, Miguel Delgado, 276
Conway, Herbert, 197
Cook, Francis N., 388
Cooke, Robert E., 508
Cooley, Denton A., 552
Cooley, R. N., 511
Cordes, E., 257
Corelli, D., 412
Corry, D. C., 13
Cosbie, W. G., 166
Costantini, 353
Costantini, A., 590
Cote, M., 482
Cottafavi, M., 311
Cotton, Bert H., 336
Coulthard, H. S., 497
Couniot, Jacques, 254
Coury, John J., Jr., 462
Couvelaire, R., 574
Coxon, M., 234
Craffey, Edward J., 238
Crafoord, C., 130
Crafoord, Clarence, 133,550
Craig, Winchell McK., 92, 548
Cramer, Hans, 205
Crane, Chilton, 589
Crawford, G. N. C., 232
Crawford, John K., 237
Creadick, Robert N., 360
Credidio, Lindoro, 480
Creech, Oscar, 454
Crenshaw, John L., Jr., 172
Criscitiello, Modestino G., 488
Cron, R. S., 45
Cronkite, E. P., 410, 596
Cross, Federick, S., 454
Crowley, Lawrence G., 508
Cruickshank, D. Barron, 137
Csipak, J., 580, 587
Cuccia, Carlo, 304
Cullen, T. H., 545
Culp, Ormond S., 370
Cunningham, Leslie, 262

D'Abreu, A. L., 128
Da Costa, José Filipe, 248
Da Costa, Barros Albertino, 51
Dagradi, A., 156
Dahlin, David G., 350
Dahn, Hugo, 271
Dahr, Peter, 273
Dailey, U. G., 258
Dale, W. Andrew, 297, 505
D'Allaines, F., 338
Dameshek, William, 264, 563
Damiani, Roberto, 103
Danon, L., 473
Daoud-Gutmann, Jacqueline, 345
Dargent, M., 475
Da Silva Bastos, Enrico,263
Daubert, K., 348
D'Aubigné, R. Merle, 582
David, A. K., Jr., 357
David, M., 11
Davids, Arthur M., 359
Davies, Orland G., 440
Davis, Harry A., 333
Davis, John P., 372
Davis, Julius T., Jr., 567
De, S. N., 309
De Abreu, Lauro Barros, 591
Deaton, W. Ralph, Jr., 449
De Azevedo, Nair, 399
DeBakey, Michael E., 129, 454, 552
DeBord, Robert, 104
De Brabandere, L., 476
deBrux, Jean, 157
DeCamp, Paul T., 129
Decker, P., 136
Declercq, F., 335
Deddish, Michael R., 349
Dedeu, R. Almasque, 467, 468
Deeb, Paul H., 512
De Franchis, Marcello, 147
Degaard, Haakon, 410
Deininger, H., 394
Dei Poli, G., 590
Delafontaine, Pierre, 550
Delannoy, Émile, 595
Delarue, J., 15, 336, 448
Delarue, N. C., 129
Delascio, Domingos, 480
De La Sierra Cano, L., 587
Delavault, 165
Del Buono, Giuseppe, 95
De Leo, Ferdinando, 256
DeLozier, Oliver, 273
Dennison, Wallace M., 286
Denolin, H., 402
DePalma, A. F., 181
Depierre, R., 336, 448
De Polo, Edwin J., 195
De Racker, Ch., 283
Derlacki, Eugene L., 325
Deroy, Mayer S., 375
Derr, John Wm., 555
Derra, E., 21
Derrick, William S., 196
D'Errico, Giovanni, 190
Desneux, J.-J., 357
De Takats, Geza, 294
Deterling, Ralph A., Jr., 84
Détrie, Ph., 471
Dettre, G., 580, 587
Deuchar, D. C., 131, 131
deVeer, J. Arnold, 544
De Vetten, A. L., 396
Devic, G., 467
Dewar, F. P., 497
De Watteville, H., 473
Dexter, Lewis, 132
Dickey, Lloyd B., 245
Dickson, James F., 132
Dickstein, Alice, 165
Di Domizio, L., 38
Dieckmann, Wm. J., 481
Diffenbaugh, Willis G., 156
Dillard, George, 596
Di Natale, Luigi, 257
Discombe, George, 504
Dobbie, John J., 586
Dockerty, Malcolm B., 567
Dodelin, Richard A., 403
Dodge, H. W. Jr., 241, 548
Dodrill, F. D., 133
Dogliotti, A. M., 18, 453, 590
Dolton, E. G., 133
Domenici, A., 205
Donovan, T. J., 247
Donzelot, E., 338
Dornan, Dallas D., 252
Douglas, A. A., 324
Douglas, Gordon, 51
Dragstedt, Lester R., 29, 344
Dreiling, David A., 34
Drye, James C., 393
Dubarry, E., 349
Dubarry, J., 349
Dubost, Ch., 59, 338, 451
Du Bouchet, Nadia, 402
Dubrovsky, Ricardo, 274
Ducassou, J., 63, 577
Ducuing, J., 390
Duffield, J. E., 242
Dufour, J.-J., 585
Dufour, M.-R., 463
Duhamel, Bernard, 145
Duke Elder, Sir Stewart, 2
Dumont, A., 335, 402
Dunlop, George R., 187
Dunn, Fred Squier, 119
Dunnington, John H., 6
Duperrat, 165
Duprez, A., 335
Durand, L., 281
Durieu, H., 335
Dvoskin, Samuel, 146
Dye, William S., 292

Earn, A. A., 55
Eastcott, H. H. G., 247 392
Ebbehøj, Erik, 98
Edmiston, Malcolm, 440
Edwards, Ernest Goodall, 73
Edwards, Jesse E., 127
Edwards, Thomas M., 328
Efferse, P., 487
Ehalt, Walther, 73
Ehrenpreis, Theodor, 37
Eicholz, L., 156, 468, 475
Eisenreich, Franz X., 394
Ekengren, Kristina, 408
Ekesparre, W. v., 348
Ekholm, Ragnar, 501
Ekman, C.-A., 87
Ekström, G., 87
Ekström, Tore, 32
Eliasch, Harald, 133
Eliel, Leonard P., 507
Elkin, Daniel C., 388
Elliott, Gladden V., 145
Elliott, John, 393
Elliott, Robert V., 406
Ellis, Henry Jr., 127
Ellis, Laurence B., 132
Ellison, Edwin H., 94
Elman, Robert, 192
Elsey, Edward C., 306
Elton, Arnold, 371
Eltorm, Helge, 410
Elwood, J. S., 370
Emery, F. B., 140
Emery, John L., 145

Emmett, John L., 490
Engley, B. W. D., 93
Engström, Arne, 405
Enjalbert, A., 390
Enos, Marjorie V., 5
Epstein, Harold C., 340
Erich, John B., 8
Erwin, Paul D., 91
Eschapasse, H., 390
Esquivel, Ricardo B. M., 93
Estes, William L., Jr., 264
Evans, Arthur T., 86, 306
Evans, Edward T., 375
Evans, Everett Idris, 404
Evans, R. Winston., 262
Evans, Shirl O., 344
Everson, Tilden C., 159, 209, 347
Exner, Gerhard, 180
Eyre-Brook, A. L., 330
Eytinge, Ernest J., 569

Fairey, P. W., 494
Fairlie, Chester S., 302
Falconer, B., 359
Familiari, Roberto, 162
Farina, Roberto, 102
Farran, H. E. A., 123
Farrand, Robert E., 132
Farris, Edmond J., 68
Fassio, Étienne, 41
Favre, 44
Feeney, J. K., 56
Fei, Li-Min, 458
Felber, Ernest, 60
Feldman, Maurice, 354
Fellander, Mac, 379
Fellinger, K., 120
Felsenreich, Fritz, 469
Felson, Benjamin, 306, 513
Fender, Frederick A., 438
Feng, Ch'uan I, 458
Fenton, Arnold N., 481
Fenton, Richard, 498
Ferloni, Ercilia R. J., 274
Fernández, Pablo Espinoza, 384
Feroldi, J., 156, 467
Ferraris, Alfredo, 160
Ferris, Eugene, B., 67
Ferro, Patrick V., 393
Fèvre, Marcel, 145
Figueras, Edmundo R., 19
Filho, Clementino Fraga, 130
Findlay, Charles W., Jr., 509
Finn, William F., 474
Finneran, J. C., 190
Finnerty, Frank A., Jr., 480
Fiore, Mario, 414, 597
Fisch, Charles, 142
Fischer, Ludovig, 594
Fischgold, H., 11
Fisher, A. Murray, 509
Fisher, Harry, 375
Fisher, John H., 264
Fisher, Miller, 2
Fitzpatrick, Raymond J., 66
Fleischner, Felix G., 199
Flint, George W., 141
Flynn, J. Edward, 508
Fomon, Samuel, 236
Fontaine, René, 311, 518
Forsee, James H., 130
Fort, Adolfo, 578
Fort, Chester A., 279
Foti, M., 104
Fourtes, C., 206
Foust, Glenn T., Jr., 45
Fox, Francis E., 5
Fracassi, Teodoro, 438
Franchi, M., 457
Francioli, P., 331
Francke, Dietrich, 361
Frank, Edward D., 29
Frank, Howard A., 442
Frank, Paul, 518
Franklin, R. H., 455, 565
Franksson, C., 409
Fraser, Russell, 120
Frederic, J., 100
Freelander, Samuel O., 340
Freeman, L. W., 190
Freeman, Norman E., 85, 188
French, Arthur B., 302
Frenckner, Paul, 432
Frey, E. K., 452
Friedman, A. I., 144
Friedman, Barry, 184
Friedrich, H. W., 395
Fries, Bengt, 244
Fruehling, Louis, 48, 482
Fruhling, L., 175
Frumusan, P., 141
Funck-Bretano, P., 473

Gabriel, W. B., 560
Gadermann, E., 452
Gaehtgens, Gerhard, 366
Gainey, Harold L., 364
Galindez, Fermin, 519
Gallardo, Carlos A. Sosa, 160
Gallus, P., 40
Galvão, Jose, 25
Galvão, Lucio, 25
Galy, P., 15, 442
Gangolphe, M., 467
Gans, Benjamin J., 80
Gareis, Louis C., 364
Garland, T. O., 93
Gardner, Campbell McG., 37
Gardner, Clarence E., Jr., 461
Gardner, Lawrence, W., 370
Gardner, W. James, 305
Garrett, Robert A., 367
Gårson, Philip, 7
Gåsström, R. V., 411
Gates, Olive, 568
Gautier, P., 595
Gaynin, Henry T., 5
Gebhart, W., 289
Geisendorf, W., 473
Geissendoerfer, R., 461
Gelbke, Heinz, 585
Gelders, N. H., 365
Gérard, P.-L., 593
Gerbaux, A., 295
Gerrard, John, 7
Gertz, Tyge Cl., 487
Gerwig Walter H., Jr., 88
Gianaroli, L., 270
Gibbs, Erna, L., 428
Gibson, William E., 475
Gilfillan, Rutherford S. 188
Gilles, Hunter, 242
Gillies, John, 193
Giova, C., 335
Girard, J., 583
Gismondi, Tobías, 377
Gittens, S. Aubrey, 550
Glahn, Mogens, 239
Glanton, James B., 66
Glasser, Samuel M., 330
Glenn, Frank, 346
Glenn, William W. L., 131
Gluecksmann, A., 99
Goffrini, Piero, 309
Goidanich, I. F., 285
Gold, M. A., 252
Goldberg, Jacob, 19
Goldblat, A., 194
Goldenberg, Raphael R., 584
Goldman, Joseph L., 341
Goligher, J. C., 255
Gomez, Alphonse, C., 520
González, Abraham Ayala, 342
Goodman, Herbert L., 175
Goormaghtigh, N., 57
Gordet, G., 457
Gordon, Charles A., 54
Gordon, William B., 333
Gott, J. Richard, Jr., 252
Gould, David, M., 406
Gow, J. G., 559
Goyette, Edwin M., 130
Gozzo, Giuseppe, 138
Graham, James M., 248
Grawitz, P. Busse, 324
Gray, Frank D. Jr., 247
Gray, Howard K., 92, 350
Grebe, Hans, 486
Greco, E., 270
Greeley, Paul W., 403
Green, James L., 491
Greenberg, Mervin W., 172
Greenberger, Arthur J., 179
Greenberger, Monroe, E., 179
Greene, Barnett A., 401
Greer, Daniel, 134
Grégoire, M., 549
Grellet, Maurice, 198
Grettve, Sten, 254
Gricouroff, Georges, 204
Griffiths, I. H., 571
Griffitts, James J., 393
Grimson, K. S., 558
Grindlay, John H., 127
Grizi, Giuseppe, 309
Groh, H., 577
Gropper, Arthur L., 521
Grossman, Morton I., 469
Grundmann, Gerhard, 394
Gucker, Thomas, III, 381
Guetgemann, A., 26, 455
Guilhem, P., 164, 484
Guillaume, J., 593
Guilleminet, M., 581
Guiot, G., 11
Gutmann, R. A., 345
Gutteridge, Eric, 118
Guy, Chester C., 149
Guzauskas, Anthony C., 141
Guzzardella, C., 206
Gylling, Martti, 125
Gylling, T., 45

Haberlin, John P., 238
Habif, David V., 412
Haers, R., 254
Hagge, Donald R., 462
Haglund, Göran, 135
Hahn, George A., 271
Haik, George M., 429
Halbert, Seymour P., 429
Hall, Donald W., 359
Hall, Wendell H., 89
Hallberg, Olav E., 8
Halminen, Eero, 363
Halpern, Bernard, 410
Halsted, George O., 590
Hamblen, Edwin C., 578
Hamilton, Joseph E., 393
Hamm, Frank C., 373
Hammond, Carolyn W., 516
Hampton, L. Jennings, 402
Handousa, Ahmad Bey, 115
Hanna, Charles B., 554
Hansen, P. Bjerre, 413
Hardin, Creighton A., 42, 292, 391
Hargreaves, Harold P., 563
Harken, Dwight E., 132
Harlin, Harrison C., 373
Harman, J. B., 454
Harper, Fred R., 456
Harrington, Stuart W., 244
Harris, R. I., 497
Harris, William, 308
Harrison, B. B., 33
Harrison, Charles S., 346
Harrison, G. Kent, 137
Harrison, J. Hartwell, 488
Harrison, R. J., 120, 279
Hartert, J., 479
Hartl, F., 597
Hartl, H., 478
Hartung, L., 549
Hasner, E., 192
Hartman, Clarence R., 154
Hauberg, G., 77
Hauch, Paul P., 306
Haug, Chester A., 505
Hauser, Cyril H., 81
Hawe, Philip, 262
Hayes, Edward W., Jr., 333
Hayward, Joseph C., 66
Healey, John E., Jr., 339

Hébard, H., 66
Heinz, Ian, 563
Heiser, Saul, 202
Hellens, A., von 48
Helpern, M. M., 232
Hempelmann, Louis H., 203
Hendrick, James W., 240
Henning, N., 142
Hendelman, M., 51
Hennessy, James P., 570
Henninger, H., 576
Hepler, Thomas K., 567
Hepp, Jacques, 159
Heptinstall, R. H., 545
Hergarten, H., 100
Hergarten, L., 100
Hermann, Kate, 1
Herndon, Charles H., 71
Herrmann, K. O., 407
Hershberger, Lloyd R., 448
Hershenson, Bert B., 275
Hertz, John, 231
Heyman, Clarence H., 71
Hickson, Barbara, 242
Higgins, Robert S., 45
Hight, Donald, 468
Hill, John R., 149
Hill, Robert P., 357
Hiltz, J. E., 128
Hinton, J. William, 337
Hirdes, J. J., 444, 445
Hirsch, Carl, 500
Hirsch, Oscar, 437
Hirsh, Ira J., 6
Hoffman, Byron J., 279
Hoffman, Elmer, 137
Hoffman, Joseph G., 203
Hoffmann, George T., 417
Hoffmann, Victor, 460
Höjensgård, I. C., 87
Holden, William D., 261
Holle, F., 449
Hollenberg, Henry G., 126
Holmes, Edgar Miller, 322
Hongisto, Sanni, 161
Hopkins, James E. T., 446
Hoppeler, A., 141
Horn, Robert C., Jr., 9
Horrax, Gilbert, 548
Houlton, A. C. L., 234
House, Howard P., 118
Houseworth, J. H., 142
Howard, Alma, 595
Howes, Edward L., 509
Huang, Ts'ui-Ting, 458
Hueston, J. T., 412
Hufnagel, C. A., 247, 392
Hughes, Carl W., 388
Hughes, C. Robert, 305
Hughes, E. S. R., 153, 155
Huguenard, P., 194
Hull, James E., 599
Hurxthal, Lewis M., 519
Huu, Nguyen, 442
Hyman, Selma, 431
Hyslop, Volney B., 119

Ikonomov, Il., 80
Imhaeuser, G., 73
Imperati, Luigi, 285
Inclan, Alberto, 287
Ingalls, Theodore H., 232
Iñigo, J. Rodriguez, 588
Insausti, Tomàs, 329
Ippolito, Anthony, 287
Isaksson, Björn, 260
Iselin, Marc, 443
Islami, Abdol, 309
Isler, W., 78
Ivins, Joseph L., 137
Ivy, Robert H., 237

Jackman, Raymond J., 280
Jackson, A. V., 128
Jackson, C. R. S., 234
Jackson, D. P., 410
Jacobi, J., 247
Jacobs, Arthur, 493
Jacobs, G. J., 596
Jacques, William E., 573
James, Theodore, 180
Janssens, J., 485
Jaretzki, Alfred, III, 391, 412
Jefferson, N. C., 258
Jenkins, S. Aubrey, 549
Jenkinson, Edward L., 200
Jensen, Frederick G., 91
Jensen, Ole J., Jr., 579
Jensenius, Hans, 75
Johanning, Kurt, 378
Johanson, Carl-Erik, 411
Johns, H. E., 411
Johnson, Balbina A., 398
Johnson, James F., 143
Johnson, Louis H., 288
Johnston, Charles G., 40
Johnstone, A. S., 565
Jones, David B., 128
Jones, F. Avery, 565
Jones, H. Everley, 133
Jönsson, Gunnar, 303
Jordan, Claus G., 43
Joseph, J., 416
Joyeux, 158
Jud, Hans, 581
Judd, Edward S. Jr., 465
Julian, Ormand C., 292
Jurewicz, A., 163

Kaeser, O., 363
Kahanpää, V., 45
Kambourakis, John G., 569
Kaplan, Abraham, 82
Kaplan, Melvin S., 196
Karnell, Johan, 303
Keeler, James E., 364
Keeley, John L., 141
Keeley, Robert L. A., 520
Keet, John E., 590
Keil, Philip G., 95
Keith, Haddow M., 241
Kelemen, George, 322
Kendell, H. Worley, 510
Kennedy, R. J., 400
Kepp, R. K., 48
Kerman, Herbert D., 201
Kern, Howard M., 137
Keshishian, John M., 555
Kessler, Henry H., 81
Key, James A., 346
Kieler, Jørgen, 413
Kimbrough, James C., 369
Kinder, C. H., 147
King, Arthur B., 406, 547
King, E. S. J., 124
Kinmonth, J. B., 86, 293
Kinnaird, David W., 393
Kirklin, B. R., 407
Kirsner, Joseph B., 560
Kittle, C. Frederick, 42
Klapp, B., 289
Klein, M., 311
Kleinberg, Samuel, 82
Kleinfeld, Louis, 236
Knipping, H. W., 551
Knowles, Harvey, C., 513
Knudson, Alfred G., Jr., 367
Koeberlé, F., 205
Koenig, Peter, 326
Kohlmayer, Hans, 580
Komins, Cecil, 71
Koncz, Josef, 598, 599
Koontz, Amos R., 251
Kourias, Bas., 260
Kovačević, 387
Kretič, 387
Kretschmer, Herman L., 374
Krohmer, Jack S., 117
Kudner, Donald F., 499
Kühnel, Poul, 472

Laborit, H., 194, 398
Lacour, R., 581
Ladislas, Serafin, 503
Ladstaetter, L., 399
LaDue, John S., 146
Laffitte, A., 159
Lafuente, Adolfo, 519
Lahey, Frank H., 30
Lairy-Bounes, G. C., 11
Landesman, Robert, 51
Lane, Stanley L., 323
Lang, Edgardo, 309
Langenskiöld, A., 380
Langenstrass, Karl H., 5
Langman, J., 248
Lans, Hyman S., 345
Lapidus, Paul W., 498
Large, Alfred, 40
Larget, Paul, 467
Larsson, H., 241
Larsson, Lars-Gunnar, 199
Lataste, J., 471
Lathrop, Frank D., 437
Latscha, B., 402
Latteier, Karl K., 200
Laufer, Maurice W., 293
Lauge-Hansen, N., 501
Laupus, William E., 430
Lavine, Oscar, 5
Laws, John, 207
Lawson, Lawrence J., 544
Lebel, M., 401
Leblanc, M., 401
Leeds, Frank H., 85
Leger, Lucien, 258, 471
Legros, M., 482
Leite, Guilherma Moreira, 263
Leitner, Moses J., 43
Lemaitre, G., 595
Lenègre, J., 295
Leng-Levy, J., 599
Lepan, R., 158
Lepri, Giuseppe, 2
Leriche, René, 123
Leroy, G. V., 410
Levaditi, C., 597
Leventhal, G. S., 584
Levi, G. F., 471
Lévy-Solal, E., 55
Lewis, Evan L., 369
Lewis, George T., 393
Lewis, Lloyd G., 166
Lewisohn, Richard, 462
Lewison, Edward F., 13
Lewy, Raphael, 236
Lezius, A., 452
Lian, C., 295, 434, 439
Liebschner, K., 449
Lièvre, J.-A., 64
Lillie, Richard H., 562
Limbosch, J., 556
Lindahl, Olov., 587
Lindblom, K., 409
Lindenschmidt, Th.-Otto, 158
Lindquist, Inge, 386
Lindström, Nils, 382
Lingley, James R., 468
Linsman, Joseph F., 202
Linton, Robert R., 84
Lippmann, Heinz I., 503
Lisco, Hermann, 203
Little, David L., Jr., 402
Lob, Alfons, 342
Lockard, Vernon M., 512
Locket, S., 233
Lockhart, George, III, 400
Lodewijks, H. B., 36
Loef, John A., 61
Loehr, Berthold, 442, 456
Loeweneck, M., 247
Löfgren, L., 310
Lombard, Herbert L., 568
Long, Perrin H., 432
Longefait, H., 549
Longo, Orlando F., 160
López, J. Varela, 352
Lortat-Jacob, J.-L., 258
Loughry, Charles W., 261
Love, J. Grafton, 241
Lovingood, Charles G., 42, 94, 208
Lowsley, Oswald S., 571
Lubert, Mortimer, 340
Lund, A., 487
Lundy, John S., 92
Lunghi, Franco, 344
Lupton, Charles Hamilton, 298
Lurie, Paul R., 247
Lyall, David, 239
Lyda, Wood, 429
Lynn, R. B., 294
Lyons, John F., 387

Macarini, N., 98
Macbeth, Ronald, 322
MacDowell, Muriel, 102
Macgregor, Agnes, R., 483
MacHale, S. J., 128
Mackintosh, Janet, 416
MacMahon, H. Edward, 573
Madding, Gordon F., 448
Maddox, J. K., 246
Magendie, J., 126
Magill, H. Kelvin, 78
Maingot, Rodney, 358
Malhotra, S. L., 103
Mallet-Guy, P., 156, 467, 468
Maloney, James V., Jr., 196
Malossi, Luigi, 384
Mandel, P., 311
Manuel, Rivera S., 71
Manzi, A., 124
Marcel, J. E., 167
Marchal, 158
Marchetti, Andrew A., 166
Marcozzi, Giovanni, 20
Margotton, R., 28
Marinkovic, Antonio, 198
Marks, Hirsch, 307
Marqués, P., 148
Marquez, Fernando, 368
Marren, Murray, 349
Marshak, Richard H., 144
Marshall, Millard R., 294
Marshall, Samuel F., 30
Marshall, Victor F., 491
Martin, Bruce C., 208
Martin, Charles L., 238
Martin, Hayes, 543
Martin, Mary M., 564
Martin, Peter, 294
Martinuzzi, Danilo, 17
Martorell, Fernando, 190
Marziale, Pietro, 268
Masenti, E., 463
Massart, Raphaël, 379
Massazza, Mario, 163
Masters, Frank W., 562
Matera, Raul F., 11
Mattick, Walter L., 238
Matute, Angel, 73
Mau, C., 98
Maul, Georg, 274
Maurath, J., 551
Maurer, Elmer R., 552
Mauritzen, Knud, 281
Maurizio, Eugenio, 164
Mauro, C., 43
Mauro, Carlo, 553
Maxwell, Doris Bender, 9
Maxwell, J. H., 124
Mayer, Edgar, 16, 550
Mayer, M., 484
Mayer-Gross, W., 242
Mazursky, Milton M., 140
McCleery, Robert S., 87
McCorkle, H. J., 440
McCoy, John M., 154
McCune, William S., 555
McDonald, John R., 490
McDowell, Allyn J., 397
McGarvey, Richard N., 475
McGavack, Thomas Hodge, 433
McGraw, Arthur B., 370
McGovern, Vincent J., 205
McGowan, John, 393
McKeown, K. C., 549
McKissock, Wylie, 123
McKusick, Victor A., 23
McLaren, Hugh C., 266
McLaughlin, Charles W. Jr., 559
McLaughlin, Ralph S., 4
McLean, E. K., 287
McLean, Franklin C., 387
Medlar, Edgar M., 334
Meehan, Donald J., 238
Meigs, Joe V., 49
Meilicke, F. F., 264
Meirowsky, A. M., 62
Meiss, W.-C., 383
Meleney, Frank L., 398
Mendelsohn, Ernest A., 29
Méndelsohn, Harvey, 340
Menéndez, H., 294
Merger, R., 269
Mersheimer, Walter L., 347
Métianu, C., 338
Métras, H., 549
Metzger, James T., 562
Meyer, Karl A., 345
Meyer, Samuel J., 544
Miceli, Roberto, 202
Middleton, Margaret, 568
Mihaly, John P., 550
Milanés, B., 588
Milhiet, H., 159
Millar, E. Joan, 195
Miller, Alexander, 184
Miller, Charles J., 349
Miller, C. Phillip, 516
Miller, G. Gavin, 37
Miller, Joseph M., 432
Milliez, P., 59
Mills, F. H., 246
Mirizzi, P. L., 158
Moccia, Gaetano, 282
Moersch, Herman J., 334
Moeys, E. J., 287
Moffett, A. J., 325
Möller, T., 87
Mollison, P. L., 277
Mollison, P. M., 364
Mondor, Henri, 50
Monro, R. S., 545
Monroy, P. Tulio, 55
Monsaingeon, A., 396
Montrieul, B., 205
Moore, Daniel C., 301
Moore, J. G., 53
Moore, Moore, Jr., 497
Moore, Thomas, 369
Moore, William W., 237
Morfit, H. Mason, 543
Morgan, C. Naunton, 153
Morgan, R. S. 416, 416
Morgan, Thomas W., 208
Morgenthaler, F., 295
Moricard, R., 472
Morley, Harold V., 370
Mosekilde, Eyvind, 98
Moser, R. H., 142
Moses, M. J., 515
Moyson, François, 466, 517
Mudge, Thomas J., 148
Muehlbock, O., 567
Mueller, U., 180
Muellner, S. Richard, 574
Muffang, Yves, 25
Mukherjee, S. R., 490
Mulé, Joseph E., 545
Muricchio, Costantino, 377
Murphy, Edward S., 548
Murphy, James D., 446
Murphy, Rosemary, 519
Murray, Gordon, 21

Nagel, M., 40
Narat, Joseph K., 92
Nazroo, I. A., 233
Nelson, D. H., 409
Nemir, Paul Jr., 147
Nenna, A., 59
Neuhof, Harold, 245
Neuman, Zvi, 154
Nevinny-Stickel, H., 277
Nichols, H. Minor, 251
Nicholson, D., 55
Nicholson, Morris J., 91
Nicolay, Kenneth S., 364
Niedner, Franz F., 340
Nielsen, H.-M., 192
Nisbet, N. W., 207, 385
Noack, Hugdieter, 570
Nobili, Luciano, 269
Norbäck, Bengt, 501
Norcross, John W., 548
Norman, Olof, 408
Norman, Ruskin C., 200
Northoff, F., 247
Novales, Carlos Garcia, 322
Noyez, D., 254
Núñez, Núñez, A., 588
Nylén, Bengt, 7
Nylén, C. O., 7

Ober, Frank R., 72
Oberhelman, Harry A., Jr., 29, 344
Ochsner, Alton, 129, 326
O'Connell, F. B., Jr., 305
O'Connor, Clarence, 6
O'Connor, S. J., 499, 586
O'Conor, Vincent J., 67
Odelberg, Axel, 148
Œconomos, N., 59
Oliva, L., 98, 104
Oliveira, Amarino C., 25
Oliver, Jean, 102
Olivier, Claude, 50, 189
O'Neil, Eugene Everett, 192
Orban, Fernand, 452
Orell, Svante, 499, 500
Ormond, John K., 494
Orr, Louis M., 66
Ostenfeld, Jørgen, 281
Östling, Gustaf, 411
Ostman, Per, 500
Oudot, Jacques, 258
Overholt, Richard H., 134
Ozazewski, John C., 324

Pack, George T., 146, 159
Padovani, Paul, 381
Paegel, Hollis, Jr., 45
Pagliardi, E., 252
Pählsson, Nils Erik, 270
Paillas, J., 336, 448
Pais, C., 183
Palmer, A. Jean, 246
Palmer, Harold D., 548
Palmer, Walter L., 560
Palomera, Enrique Sanchez, 313
Palumbo, Leonard, 360
Palumbo, Louis T., 140
Panini, Franco, 52
Parker, Edward F., 554
Parks, John, 172
Paroira, Morton D., 355
Parsons, John Robert, Jr., 561
Partington, Philip F., 261
Passarelli, Luigi, 255
Patellani, Eugenio, 206
Patronicolas, P., 454
Patterson, Howard A., 555
Patterson, Marcel, 559, 569
Patton, John F., 573
Paul, R. E., 140
Paulson, Donald L., 127
Paus, Bernhard, 385, 498
Payne, Mary Ann, 351
Pearson, Olof H., 507
Pease, Charles N., 70
Peck, Mordant F., 406
Peck, Sidney J., 172
Pecker, J., 593
Pélot, G., 66
Pendergrass, Eugene P., 511, 514
Penfield, Wilder, 405
Penido, Joao R. F., 336
Penton, R. Sim, 441
Peräsalo, O., 249
Perazzo, Giorgio, 143
Perlstein, Meyer A., 428
Perrini, Francesco, 266
Perryman, Charles R., 511
Pers, Michael, 42
Persky, Lester, 29
Perzik, S. L., 10
Pesce, G., 185
Peters, H., 598
Petkovic, Sava, 280
Pettersson, G., 33, 135, 135, 241
Pfisterer, William H., 200
Philipp, E., 477
Philippe, 148
Philippidès, D., 205
Phillips, C. W., 258
Philpott, N. W., 51
Picard, D., 59
Picchio, A., 183
Piccinno, A., 187
Piccoli, B., 43
Pickering, G. W., 88

Pickrell, Kenneth L., 562
Pierre-Bourgeois, 443
Pietri, 353
Piquinela, José A., 152
Pirart, J., 357
Pirie, Antoinette, 232
Pirkey, Everett L., 201
Pittar, C. A., 4
Piulachs, P., 569
Plandiura, Mariano Bretón, 66
Plotegher, Aldo, 33
Pointon, R. C. S., 286
Pollack, Robert S., 433
Pombo Do Amaral, Jairo, 310
Pons, H., 148
Ponthus, P., 475
Pontonnier, A., 164
Pool, R. M. 352
Porcher, Pierre, 50
Porritt, Sir Arthur, 545
Postlethwait, Raymond W., 554
Pottinger, R. E., 481
Potts, Willis, J., 104
Pou, Jaime F., 14
Poulsen, Thue, 410
Pratt, Gerald H., 507
Pratt, Joseph Hyde, 45
Preshaw, D. E., 40
Pribram, B. O. C., 467
Priestley, Bruno S., 3
Prigot, Aaron, 413
Prior, John T., 128
Probstein, J. G., 355
Proffitt, M. M., 258
Provenzale, L., 358
Puigvert, A., 61, 61
Pulaski, Edwin J., 139, 509
Pullè, Clemente, 56
Pulvertaft, C. N., 31

Quarantillo, Edward P., 1
Quinlan, J. J., 128

Radigan, L. R., 190
Ragnell, A., 520
Raisz, Lawrence G., 521
Rall, J. E., 434
Ramadier, J. O., 584
Ramos, Alberto G. Peralta, 478
Randall, Clyde L., 359
Randall, Henry T., 505
Randall, J. H., 53
Randall, Lawrence M., 567
Randall, Robert E., 288
Randall, Spears, 326
Ránky, László, 389
Ransom, Henry K., 463
Rapp, 256
Rapp, Ira H., 286
Rappaport, Israel, 16
Rascoff, Henry, 140
Ravelli, A., 379
Raven, Ronald W., 545
Rawlings, Maurice S., 154
Rawson, Rulon W., 434
Ray, C. J., 129
Redon, Henri, 198
Reed, Edsel S., 201
Reese, Evan C., 43
Regan, Ellen F., 6
Reggianini, Valerio, 467
Regnĕr, E., 241
Rehbein, Alfredo, 412
Rehn, Joerg, 517
Reid, L. Corsan, 337
Reiss, Eric, 139, 509
Reitman, Paul H., 203
Reitter, Irene, 414
Remouchamps, L., 253
Renner, W., 100
Represa, Luis Antonio, 59
Reynolds, Joyce, 520
Rhoads, Jonathan E., 9
Rhoads, Paul S., 67
Riba, Leander William, 176
Ribbing, S., 305
Rice, Carl O., 91
Richards, N. A., 53
Richardson, John S., 363
Richardson, T. R., 377
Riches, E. W., 493, 571
Rickham, P. P., 197
Ridley, Harold, 235
Riisfeldt, Ove, 167
Riker, William L., 104
Riley, T. Richard 255
Ripstein, Charles B., 37, 141
Ritchie, Saul, 500
Ritter, Ulrich, 499
Ritzenthaler, John C., 364
Robert, H.-G., 258
Robinson, Frank, 427
Rocco, B., 457
Roche, Pat, Jr., 403
Rochet, Pierre, 475
Rodger, F. C., 428
Roger, S., 175
Rollandi, Aristide, 97
Rollin, Georges, 443
Romanes, G. J., 5
Romieu, C., 258
Rooney, James A., 141
Rosa, Pierre, 173
Rose, D. K., 62
Rose, Donald L., 510
Rosenak, B. D., 142
Rosenbaum, Harold D., 559
Ross, Gordon L., 548
Ross, James A., 489
Ross, Robert A., 360
Ross, R. T., 250
Rossi, Benedetto, 14
Rossi, Gian Maria, 20
Roswit, Bernard, 550
Roth, H., 74
Rottino, Antonio, 570
Rouhier, G., 154
Rousselot, Louis M., 590
Roux, G., 256
Roux, Marcel, 468
Rowe, C. R. Jr., 558
Rowe, Robert J., 38
Rubin, Cyrus E., 560
Ruccia, P., 312
Ruette, B. von, 372
Ruffo, Antinio, 26
Ruggiero, Arturo, 457
Ruggiero, Giovanni, 405, 547
Rulla, L., 185, 333
Rundles, R. Wayne, 518
Rush, Benjamin, Jr., 357
Rush, Jack T., 1
Rush, T. W., 86
Russe, Otto, 581
Russell, Liane Brauch, 305
Russell, W. L., 305
Russenberger, G. V., 327
Ryan, Bernard J., 334
Ryan, Hugh, 116
Rycroft, B. W., 5
Rydén, Åke B. V., 408
Rynkiewicz, L. M., 481

Sabadini, L., 63
Sabaino, Dante, 33
Sabbatini, Camillo, 190
Salembier, Y., 158
Salibi, Bahij S., 105
Salner, Nathan P., 514
Saltzman, Samuel L., 5
Salvati, Rino, 377
Samain, A., 300
Sanders, George Benton, 289
Sanders, R. L., 352
Sanders, T. E., 117
Sandusky, William R., 561
Santoro, Anthony J., 584
Santy, P., 28, 442
Sarafoff, Dim., 401, 464
Sarnat, Bernard G., 80
Sautot, J., 588, 588
Sauvage, René, 550
Sawyer, J. G., 252
Sayegh, Emile S., 176
Scalettar, Howard E., 140
Scarborough, Wm. R., 23
Schafer, Paul W., 292
Schaffhauser, F., 368
Schaffner, V. D., 128
Schattner, Alfred, 236
Scheffey, Lewis C., 472
Scheibert, C. D., 62
Schepens, Charles L., 431
Schetlin, Charles F., 239
Schiff, Leon, 143, 513
Schiller, Carl, 288
Schissel, Donald J., 95
Schjøtt-Rivers, E., 266
Schlossman, Abraham, 3
Schmauss, Albert K., 597
Schmerl, Ernst, 233
Schmid, G., 595
Schmid, Luis, 183
Schneider, J., 298
Schroeder, W., 406
Schwartzman, Joel J., 202
Scott, N. Reger, 6
Scoville, A. de, 346, 397
Scuderi, Carlo, 287
Sears, Bernard, 574
Sedgwick, Cornelius E., 122
Seeley, Sam F., 388
Seidlin, S. M., 435
Seillé, Guy, 157
Seligman, Bert, 188
Sellers, Thomas, Benton, 567
Selley, I., 241
Sellors, T. Holmes, 343
Sénèque, J., 468
Sengupta, K. P., 309
Señor, Juan Carlos, 267
Servelle, M., 132
Seulberger, P., 598
Shaeffer, Joseph R., 139
Shaffner, Louis DeS., 449
Shapiro, Nathan, 143, 513
Sharp, George S., 514
Sheinmel, Archie, 330
Sherman, Arthur E., 1
Sherman, Lloyd F., 153
Sherry, Sol, 510
Sherwin, Benjamin, 66
Shingleton, William W., 357
Shipman, J. J., 455
Shorter, Gertrude, 516
Shumacker, H. B., Jr., 190, 193, 293
Shumaker, Edward J., 370
Siewers, Christian F., 586
Silver, Caroll M., 501
Silverman, Frederic N., 408
Silverman, S. Richard, 6
Simeone, F. A., 293
Simon, Gaston-Claude, 50
Simon, Stanley, D., 501
Simonart, J., 283
Simpson, James R., 237
Singh, Bawa P., 481
Siniscal, A. A., 429
Slessor, A. J., 125
Sloan, R. D., 511
Smallpeice, V., 234
Smith, Allan D., 591
Smith, A. N., 161
Smith, Arthur B., 593
Smith, Byron, 430
Smith, Curtis A., 29
Smith, Donald W., 393
Smith, Edwin L., 252
Smith, M. Katharine, 30
Smith, Newton D., 149
Smith, Parke G., 86, 306
Smith, Preben V., 365
Smith, Robert M., 301
Smith, T. B., 286
Smith, William H., 201
Snoddy, William T., 458
Snyder, Howard E., 395
Snyder, Stuart S., 51
Snyder, William H., Jr., 462
Soeur, R., 283
Somerville, Philip, 126
Sonnenschein, Arnold, 290
Sørensen, Hans Rahbek, 245
Soucheray, Philip H., 450
Soulié, P., 132
Soulier, A., 595
Sparrow, A. H., 515
Spennati, Domenico, 447
Spinner, Morton H., 43

Spohn, Kurt, 590
Spriggs, Arthur I., 492
Stack, James K., 290
Staemmler, M., 485
Stahnke, E., 32
Stallard, H. B., 432
Stapleton, J. E., 123
Stark, R. B., 404
State, David, 465
Statland, Harry, 9
Stauffer, James, 45
Stead, William W., 450
Stearns, Maus, 349
Steele, R., 515
Steimlé, R., 205
Stein, I. F. Jr., 345
Stein, Robert, J., 163
Steinberg, Bernhard, 233
Stempien, Stephen J., 557
Stephan, Edouard, 134
Stephen, C. R., 195
Stephenson, Hugh E., Jr., 337
Stephenson, Kathryn Lyle, 519
Stewart, B. D., 456
Stewart, H. L., Jr., 277
Stewart, Marcus J., 377
Stillerman, Manuel L., 428
Stilson, Walter L., 512
Stoll, Georges, 518
Stoll, Peter, 361
Storaasli, John P., 117
Storer, Edward H., 29
Strickler, J. H., 91
Strohl, E. Lee, 156
Stuckey, Edward S., 35
Stuermer, Virginia Mae, 163
Stupnicki, A., 75
Stutz, E., 591
Summerskill, W. H., 428
Sun, P. Y., 440
Sunderland, Douglas A., 349
Susnow, David A., 154
Sutherland, J. W., 281
Svien, Hendrik J., 241
Svien, H. J., 548
Swan, Henry, 130
Swan, Kenneth C., 431
Sweet, Richard Herbert, 23
Sweet, Wm. Herbert, 322
Swenson, Orvar, 573
Swick, Lois S., 429
Swinnen, R. R., 152
Swynnerton, B. F., 32
Szewczyk, Thaddeus S., 234
Tagariello, P., 187, 189
Tagariello, Pietro, 43
Tagliapietra, Bruno, 166
Taiana, Jorge A., 19
Talairach, J., 11
Tamerin, Joseph A., 195
Tan, Charlotte T. C., 309
Tanzer, Radford C., 498
Tavares, Amândio, 440
Tavenner, Michael C., 154
Taylor, Donald, 15
Taylor, H. M., 558
Tedeschi, C. G., 232
Teinturier, J., 584
Tempest, Michael N., 302
Ten Kate, J., 29
Tennison, Charles W., 119
Terruzzi, B., 373
Thackray, A .C., 571
Therkelsen, Frederik, 245
Thistlethwaite, James R., 296, 357
Thomas, Charles I., 117
Thomaschek, Guenter, 362, 366
Thomeret, Georges, 443
Thometz, Robert W., 118
Thoms, Johannes, 202
Thorn, George W., 488
Thorsrud, Gunnar, 494
Tillett, William S., 510
Tolan, John F., 301
Tompkins, Marianne, 516
Toniolo, Silla, 384
Toro, Raul Cifuentes, 476
Torraca, Luigi, 254
Torrey, W. Edward, Jr., 53
Touraine, Y., 588
Tow, P. M., 242
Trabucco, Armando, 368
Tracy, Ann, 102
Tricard, Armand, 345
Tricomi, Gaetano, 96
Troncoso, Manuel Urbie, 234
Trouette, L., 390
Truchaud, M., 401
Truelove, S. C., 32
Tulloh, Harold P., 279
Turner, Henry B., 273
Tyler, Frank H., 563

Ulfelder, Howard, 49
Umansky, A. L., 77
Urist, Marshall R., 387
Urist, Martin J., 3
Ursini, Mario, 162

Vague, Jean, 148
van Alphen, G. W. H. M., 430
Van Demark, Robert E., 180
Vandemoortele, M., 182
Van Den Bosch, 365
Van Den Broucke, C., 365
Van De Walle, J., 300
Van Hove, R., 389
Van Lerberghe, R., 253
Van Wien, Willy, 195
Vara, Paavo, 45, 363
Varangot, J., 482
Vaughn, Arkell M., 295
Vecchietti, Giuseppe, 477
Vest, Samuel A., 62, 371
Vickery, Austin L., 9
Vidal-Barraquer, F., 569
Viereck, H. J., 449
Vieta, John O., 545
Vignes, Henri, 167
Vilain, R., 509
Virgin, W. J., 82
Voelkel, O., 120
Vollmar, Joerg, 504
Voorhees, Arthur B., Jr., 391
Voris, Harold C., 329

Wagenaar, J. W., 324
Wakeley, Sir Cecil, 116
Wakerlin, G. E., 175
Walker, Exum, 237
Walker, James H., 134
Walker, John W., 513
Walker, R. Milnos, 350
Walker, W., 277
Wallace, D. M., 493
Wallner, Linden, J., 545
Walls, Gordon L., 4
Walsh, Anthony, 559
Walsh, Joseph F., 122
Walters, Waltman, 30, 175
Walton, R. J., 493
Wang, Shao-Hsun, 458
Wangensteen, Owen H., 506, 556
Ward, Simon V., 567
Warren, Kenneth W., 160
Warren, Shields, 568
Wasley, Malcolm T., 333
Wasserman, Marvin M., 9
Watson, T. A., 515
Waugh, Richey L., Jr., 429
Wayman, T. Brent, 67
Webster, Jerome P., 237
Weekes, Leroy R., 474
Weichselbaum, Theodore E., 192
Weidner, Michael G., Jr., 87
Weiford, E. C., 305
Weinberg, Arthur, 54
Weinberg, Joseph A., 557
Weinberg, Tobias, 354
Weinstein, Jacob J., 154
Weisel, Wilson, 130
Weiss, A. G., 22, 205
Welbourn, Richard B., 142
Welch, C. Stuart, 264
Welles, Edward S., 334
Welti, Henri, 295
Wenzl, M., 337
Werber, M., 551
Werelius, Carl Y., 149
Werkö, Lars, 133
Werner, Sidney C., 433
Wertheimer, P., 588
West, Philip M., 101
Weston, Sydney Donald, 349
Whipple, Allen O., 470
Whitacre, Frank E., 273
Whitby, Sir Lionel, 263
White, Frederick C., 507
White, James N., 448
White, Mary Louise, 402
Whiteman, Gabriel, 201
Whitesell, Frank B., Jr., 350
Whiteside, John H., 288
Whittemore, Ruth, 131, 247
Whittenberger, James L., 196
Whitty, C. W. M., 242
Wickster, George Z., 276
Wiersma, Alvin F., 47
Wiggins-Davies, W. W., 370
Wilhelm, Seymour F., 494
Wilhelm-Mathis, Lisa, 518
Wilkin, P., 483
Wilkins, Franklin B., 557
Wilkinson, A. W., 494
Wilkinson, K. W., 549
Williams, Ardis M., 404
Williams, D. O., 287
Williams, Mark H., 87, 143
Williams, Roger D., 94, 564
Williams, Walter W., 167
Willmann, K.-H., 594
Wilson, Edward, 487
Wilson, Hugh M., 145
Wimhoefer, H., 474, 479
Winfield, James M., 347
Wing, Elihu S., Jr., 121
Wise, Robert E., 305
Witte, S., 142
Witz, J., 22
Wood, Orlyn, 296
Wood, Paul M., 401
Woodbury, John W., 134
Woodman, De Graaf, 235
Woodruff, Michael F. A., 36
Woodward, Edward R., 29
Woringer, E., 298
Wortham, Edwin, 233
Wright, G. P., 416, 416
Wright, Howard A., 496
Wright, Jane C., 413
Wright, Louis T., 413
Wurch, Théo, 482
Wynn, Sidney, K., 119

Yarborough, John A., 87
Yarnis, Harry, 144
Ybarz, Pedro Larghero, 294, 341
Ybert, P., 482
Young, H. Herman, 289

Zak, G. A., 131
Zañartu, Juan, 578
Zannini, G., 187
Zbinden, H., 414
Zeier, Frank, 75
Zellinger, John J., 13
Zerah, Ch., 34, 141
Zerolo, Jean, 258, 471
Ziesler, Ernst, 137
Zimmerman, Leo M., 139
Zimmermann, Bernard, 506
Zinovieff, Andrew, 82
Zollinger, Robert, M., 564
Zorn, Leo, 330
Zorzi, M., 471

Public Health Service Co-operative Investigation 497

Sub-Committee on Surgica Treatment of Diseases of the Chest, 443